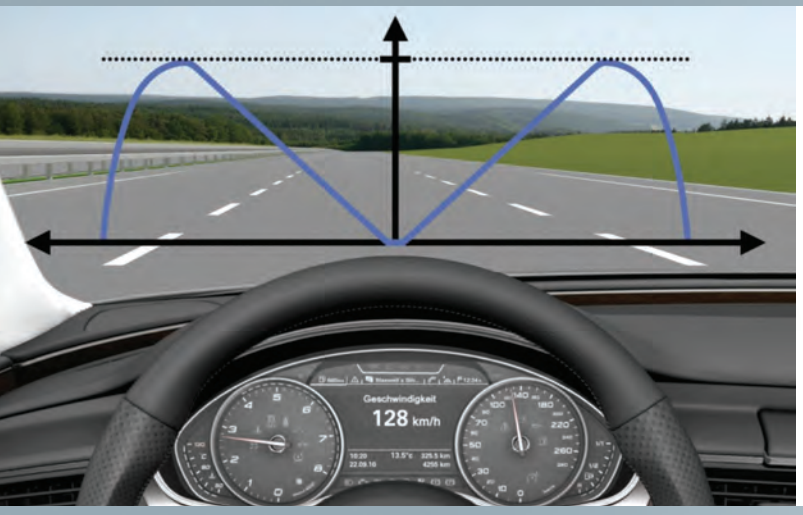
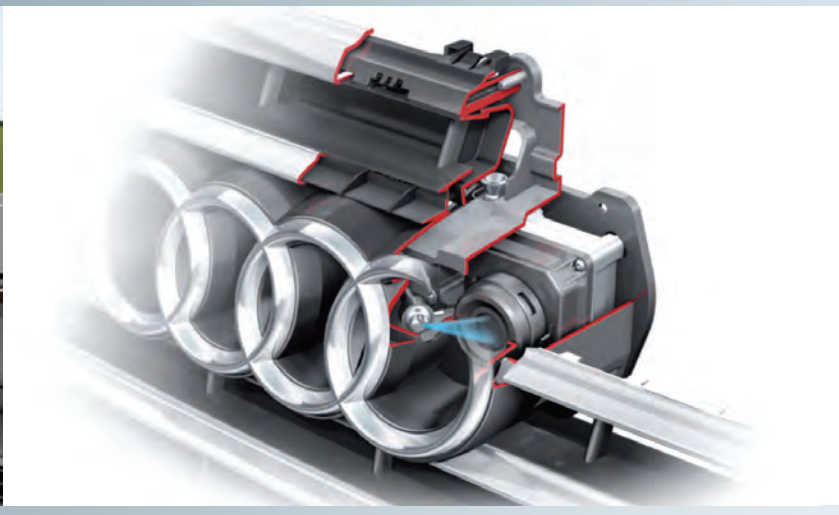
Audi Academy





Audi Driver Assistance Systems Calibration

Technician's Reference Guide

Course number 960322

Audi of America, LLC
Service Training
Printed in U.S.A.
Printed 9/2013
Course Number 960322

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Always check Technical Bulletins and the latest electronic service repair literature for information that may supersede any information included in this booklet.

Revision: 091013

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Course Description

Audi Vehicle Alignment - 960322 will provide you with the practical procedures necessary to calibrate driver assistance systems on Audi vehicles. Included is an overview of alignment procedures for driver assistance systems such as Adaptive Cruise Control, Lane Assist and Side Assist.

The course will be a combination of Instructor lecture, demonstrations, and worksheet driven exercises enabling an extensive “hands-on” experience.

This course was developed in cooperation with the Hunter Engineering Company.

Course Objectives

After completing this two day course, you will be able to:

- Understand the significance of pre-alignment procedures and conditions
- Adjust an air ride suspension to factory specifications
- Find and apply ride height specifications for vehicles equipped with steel springs
- Have a working knowledge of primary and secondary wheel alignment angles
- Understand the affect of ride height on alignment angles
- Understand the purpose of using thrust angle when calibrating some Audi driver assistance systems
- Understand the function of Steering Angle Sensor G85
- Calibrate Steering Angle Sensor G85 on a vehicle equipped with ESC
- Calibrate the Dynamic Steering system on an Audi vehicle
- Calibrate the Night Vision system
- Calibrate the Audi Lane Assist and Side Assist
- Calibrate the rear camera
- Calibrate the Top view camera system

What Must be Completed to Receive Credit?

- The on-line Knowledge Assessment
  - Found in the Audi CRC: **960322B**

The Hands-On Evaluation

In addition to the normal on-line assessment, you will be asked to individually demonstrate your ability to perform various ODIS Service functions during this class. This can happen at any time, so be prepared when asked by your instructor.

About the Technician's Reference Guide for this Course

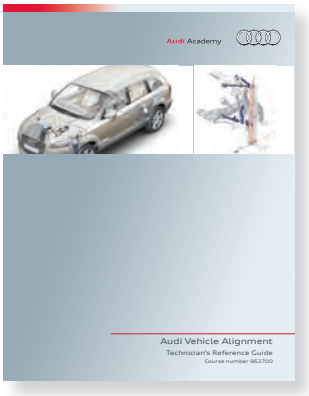
The TRG provides a notebook for you to use during this course.

The Worksheets in the TRG are designed to help you understand the concepts presented in class and allow you time to "practice."

The time and effort you put into the required tasks of this course can save you time and earn you more money in the future.

For your convenience, this TRG also includes Appendices with further information about vehicle alignment principles found in the Audi Academy course:

Audi Vehicle Alignment - 962700



Our Toolbox

Some tools can't be found in the box in your work bay.

Your tools have to include <u>all</u> available resources too.

We'll keep a list on the board. You can keep your own list on this page in your Technician's Reference Guide.

Course Goals

Our expectations of you

Safety is everyone's responsibility. Pay attention to what you are doing and always work safely!

Ask lots of questions. If we can't answer the question right away, put your question in the parking lot so it can be answered later.

Collaborate with your classmates. Nobody knows everything, but you'll be surprised how much knowledge the group has when you work together!

Don't be afraid to make mistakes! You're learning something new, so it is inevitable that you'll make some mistakes. But then again, so will everybody else! Making mistakes is part of the learning process, so don't be embarrassed. Just make sure your mistakes don't jeopardize anyone's safety!

Learning Center Ground Rules

- Park in designated areas only
- Smoke in designated areas only
- Safety glasses are required
- Vehicles cannot be started without first connecting to an exhaust hose
- Always warn other participants before switching the ignition ON or starting a vehicle
- Inform your instructor about any injuries or illness

If There is an Emergency:

Notify your instructor immediately.

If your instructor cannot respond,
call VWGoA Security at: 1-423-582-4700

Rules of Courtesy

- Be on time
- Be engaged
- Be respectful of everyone
- Ask questions

Course Agenda

Stage one

- Pre-Alignment Procedures

Stage two

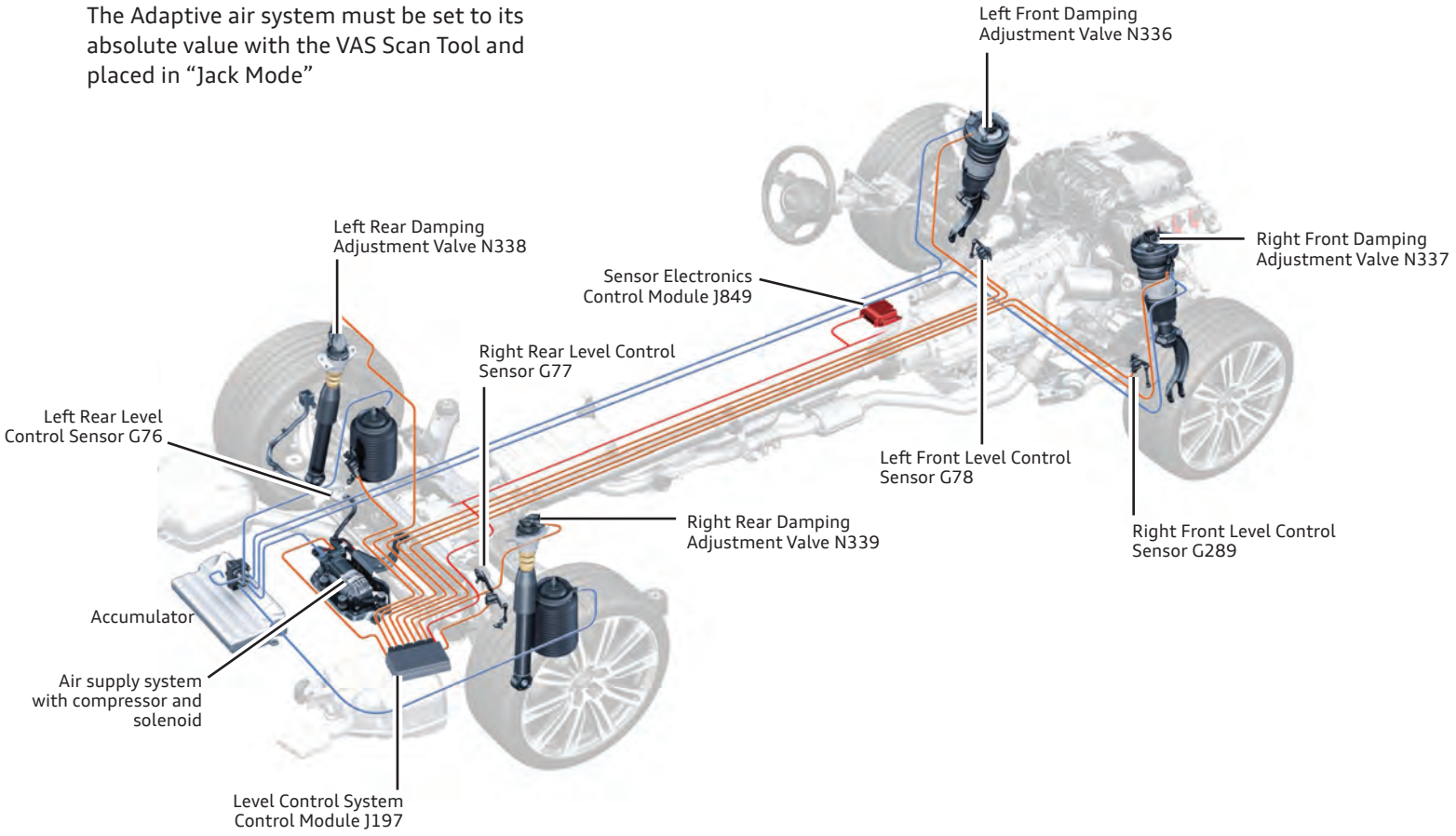
- Alignment

Stage three

- Post Alignment
  - Dynamic Steering Calibration
  - Night Vision Assist
  - Adaptive Cruise Control
  - Audi Lane Assist
  - Audi Side Assist
  - Optical Parking System
  - Rear View Camera
  - Top View Camera

Pre-Alignment Procedures

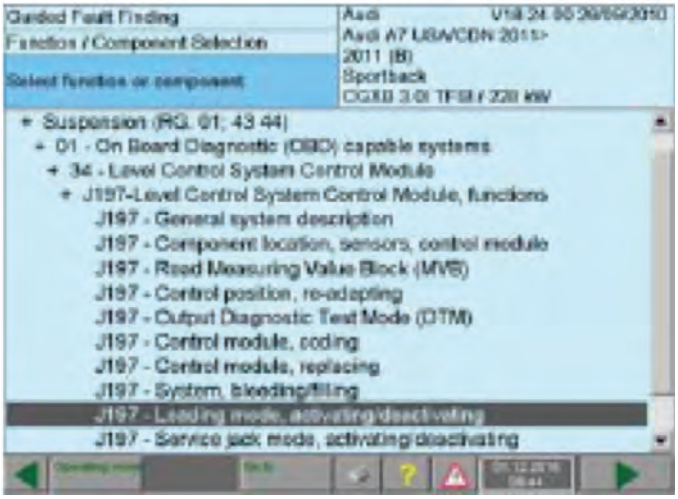
The Adaptive air system must be set to its absolute value with the VAS Scan Tool and placed in “Jack Mode”

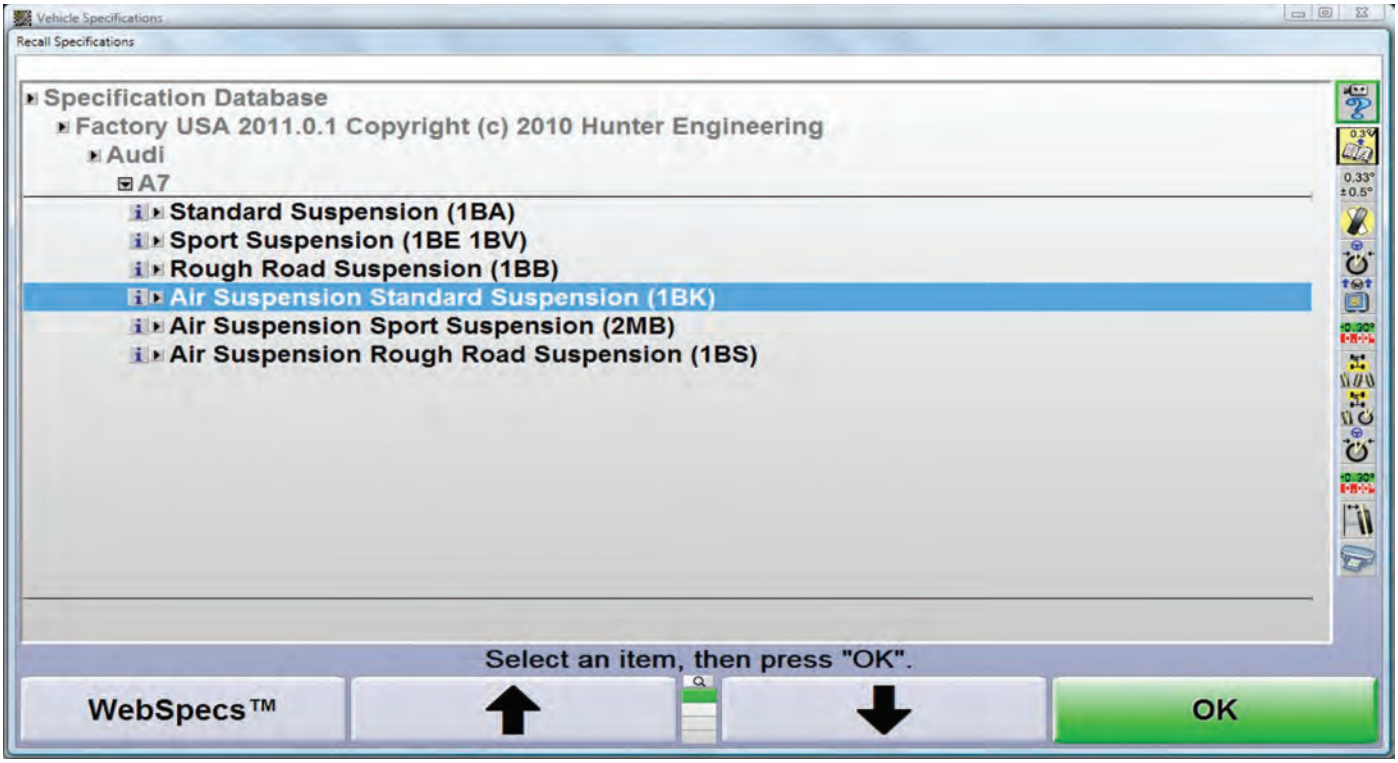

Left Front Damping Adjustment Valve N336
Left Rear Damping Adjustment Valve N338
Sensor Electronics Control Module J849
Right Front Damping Adjustment Valve N337
Right Rear Level Control Sensor G77
Left Rear Level Control Sensor G76
Left Front Level Control Sensor G78
Right Rear Damping Adjustment Valve N339
Right Front Level Control Sensor G289
Accumulator
Air supply system with compressor and solenoid
Level Control System Control Module J197

- Ride Height affects all alignment angles.
- Ride height affects the distance capability of all cameras, radar and sonar sensors, and the night vision camera.

Stage One: Pre-Alignment Procedures

- Hunter Alignment Software will guide you through all the processes.
- Read each screen carefully and follow the instructions.
- Do not skip steps or try to re-invent the process.
- Do not get “click happy” with the alignment software or the Scan Tool.
- Alignment software is vehicle specific.
- It is imperative to select the correct vehicle and suspension system.
- Run Guided Fault Finding to properly identify all modules and see if any systems have existing faults.

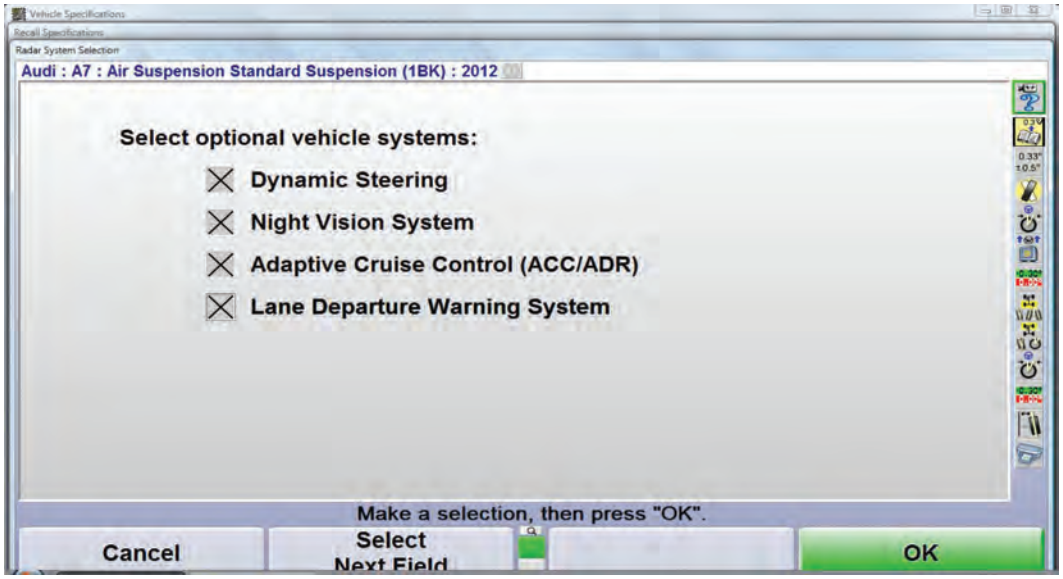

Guided Fault Finding
Function / Component Selection
Select function or component
Audi
Audi A7 USA/CDN 2011>
2011 (8)
Sportback
Suspension (RG. 01; 43 44)
01 - On Board Diagnostic (OBD) capable systems
34 - Level Control System Control Module
J197-Level Control System Control Module, functions
J197 - General system description
J197 - Component location, sensors, control module
J197 - Read Measuring Value Block (MVB)
J197 - Control position, re-adapting
J197 - Output Diagnostic Test Mode (DTM)
J197 - Control module, coding
J197 - Control module, replacing
J197 - System, bleeding/filling
J197 - Leading mode, activating/deactivating
J197 - Service jack mode, activating/deactivating



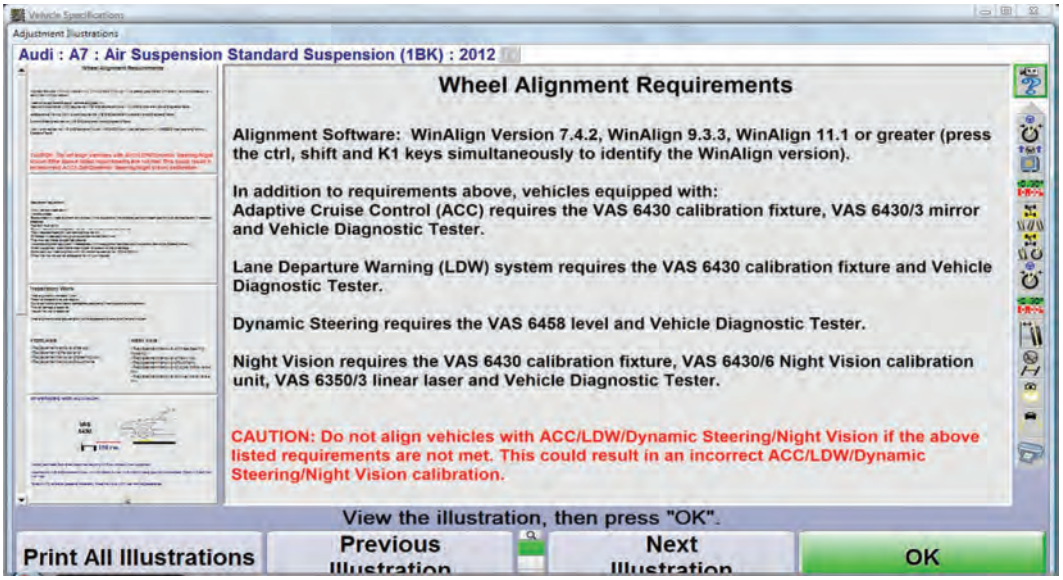
Stage One: Pre-Alignment Procedures

Select ALL options after starting the alignment software.

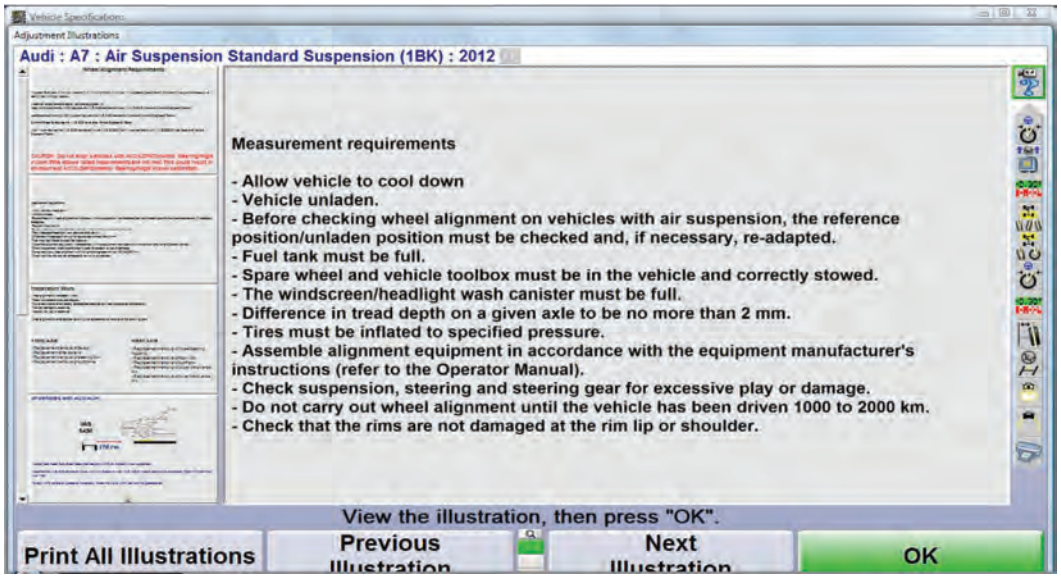
This will sequence the calibrations in the correct order.



This screen tells you about the calibration fixture tools and alignment software needed for this specific vehicle.

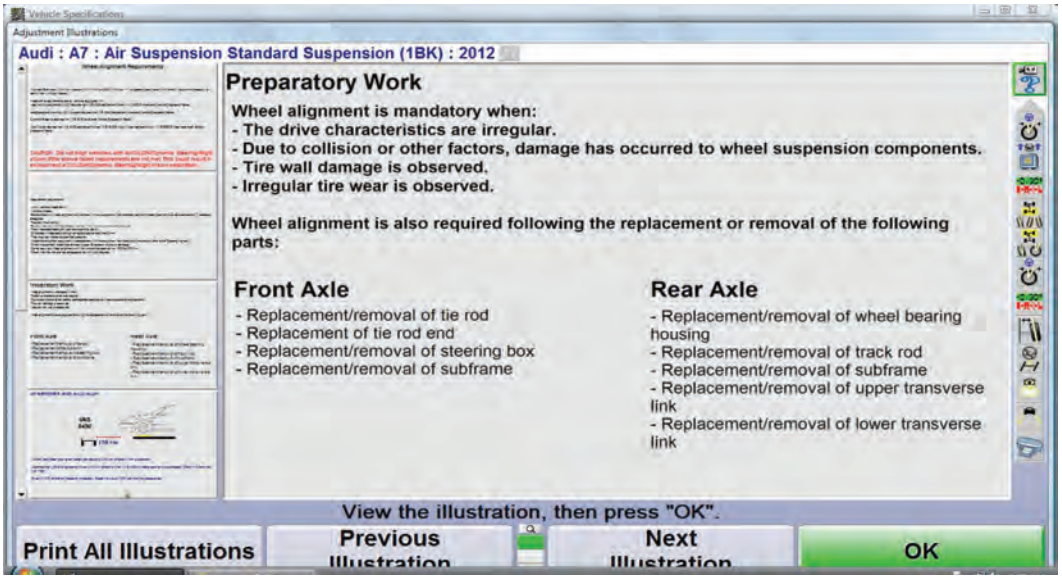

Vehicle Specifications
Adjustment Illustrations
Audi : A7 : Air Suspension Standard Suspension (1BK) : 2012
Wheel Alignment Requirements
Alignment Software: WinAlign Version 7.4.2, WinAlign 9.3.3, WinAlign 11.1 or greater (press the ctrl, shift and K1 keys simultaneously to identify the WinAlign version).
In addition to requirements above, vehicles equipped with:
Adaptive Cruise Control (ACC) requires the VAS 6430 calibration fixture, VAS 6430/3 mirror and Vehicle Diagnostic Tester.
Lane Departure Warning (LDW) system requires the VAS 6430 calibration fixture and Vehicle Diagnostic Tester.
Dynamic Steering requires the VAS 6458 level and Vehicle Diagnostic Tester.
Night Vision requires the VAS 6430 calibration fixture, VAS 6430/6 Night Vision calibration unit, VAS 6350/3 linear laser and Vehicle Diagnostic Tester.
CAUTION: Do not align vehicles with ACC/LDW/Dynamic Steering/Night Vision if the above listed requirements are not met. This could result in an incorrect ACC/LDW/Dynamic Steering/Night Vision calibration.
View the illustration, then press "OK".
Print All Illustrations
Previous Illustration
Next Illustration
OK

This screen will advise you to check the car to see if it meets minimum requirements before the alignment can be performed.


Vehicle Specifications
Adjustment Illustrations
Audi : A7 : Air Suspension Standard Suspension (1BK) : 2012
Measurement requirements
- Allow vehicle to cool down
- Vehicle unladen.
- Before checking wheel alignment on vehicles with air suspension, the reference position/unladen position must be checked and, if necessary, re-adapted.
- Fuel tank must be full.
- Spare wheel and vehicle toolbox must be in the vehicle and correctly stowed.
- The windscreen/headlight wash canister must be full.
- Difference in tread depth on a given axle to be no more than 2 mm.
- Tires must be inflated to specified pressure.
- Assemble alignment equipment in accordance with the equipment manufacturer's instructions (refer to the Operator Manual).
- Check suspension, steering and steering gear for excessive play or damage.
- Do not carry out wheel alignment until the vehicle has been driven 1000 to 2000 km.
- Check that the rims are not damaged at the rim lip or shoulder.
View the illustration, then press "OK".
Print All Illustrations
Previous Illustration
Next Illustration
OK

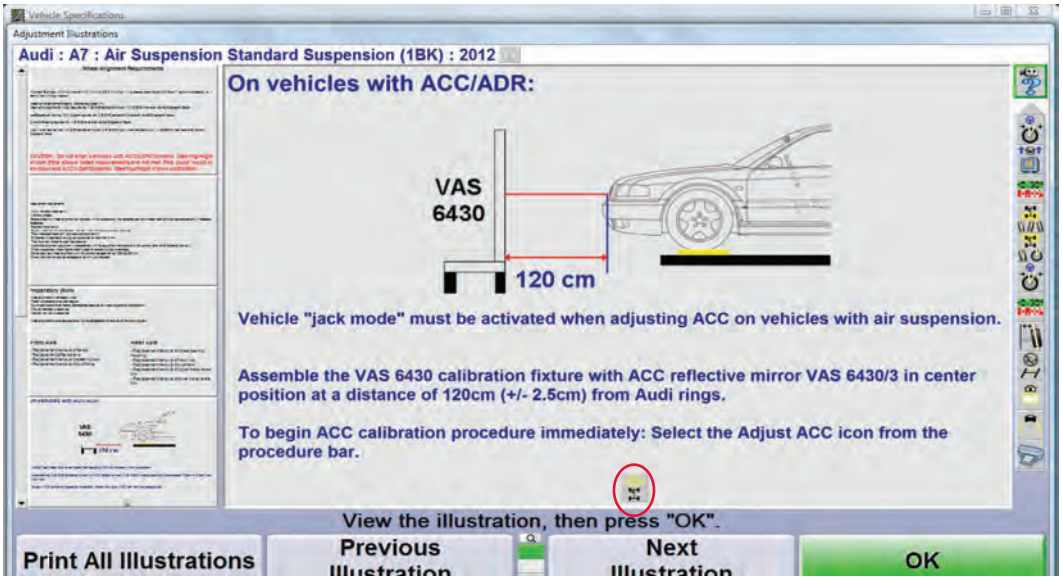
Stage One: Pre-Alignment Procedures

This screen is a reminder of when an alignment needs to be performed and not skipped.


Audi : A7 : Air Suspension Standard Suspension (1BK) : 2012
Preparatory Work
Wheel alignment is mandatory when:
- The drive characteristics are irregular.
- Due to collision or other factors, damage has occurred to wheel suspension components.
- Tire wall damage is observed.
- Irregular tire wear is observed.
Wheel alignment is also required following the replacement or removal of the following parts:
Front Axle
- Replacement/removal of tie rod
- Replacement of tie rod end
- Replacement/removal of steering box
- Replacement/removal of subframe
Rear Axle
- Replacement/removal of wheel bearing housing
- Replacement/removal of track rod
- Replacement/removal of subframe
- Replacement/removal of upper transverse link
- Replacement/removal of lower transverse link
View the illustration, then press "OK".
Print All Illustrations
Previous Illustration
Next Illustration
OK

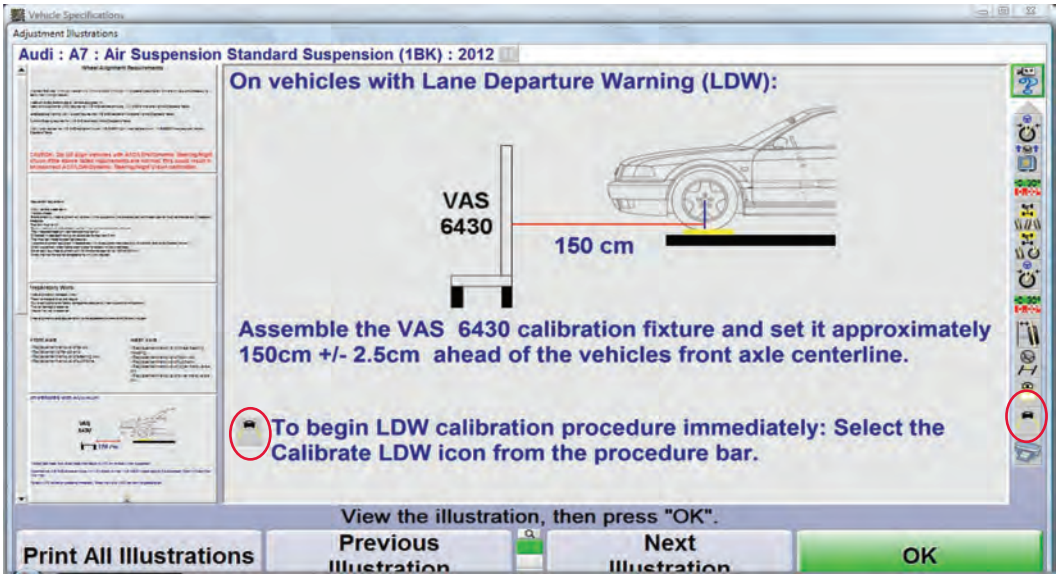
ACC/ADR set-up screen

Note instructions for going directly to calibration. This should NOT be done unless you know the car has been aligned and has a thrust angle less than 7'.


Audi : A7 : Air Suspension Standard Suspension (1BK) : 2012
On vehicles with ACC/ADR:
VAS 6430
120 cm
Vehicle "jack mode" must be activated when adjusting ACC on vehicles with air suspension.
Assemble the VAS 6430 calibration fixture with ACC reflective mirror VAS 6430/3 in center position at a distance of 120cm (+/- 2.5cm) from Audi rings.
To begin ACC calibration procedure immediately: Select the Adjust ACC icon from the procedure bar.
View the illustration, then press "OK".
Print All Illustrations
Previous Illustration
Next Illustration
OK

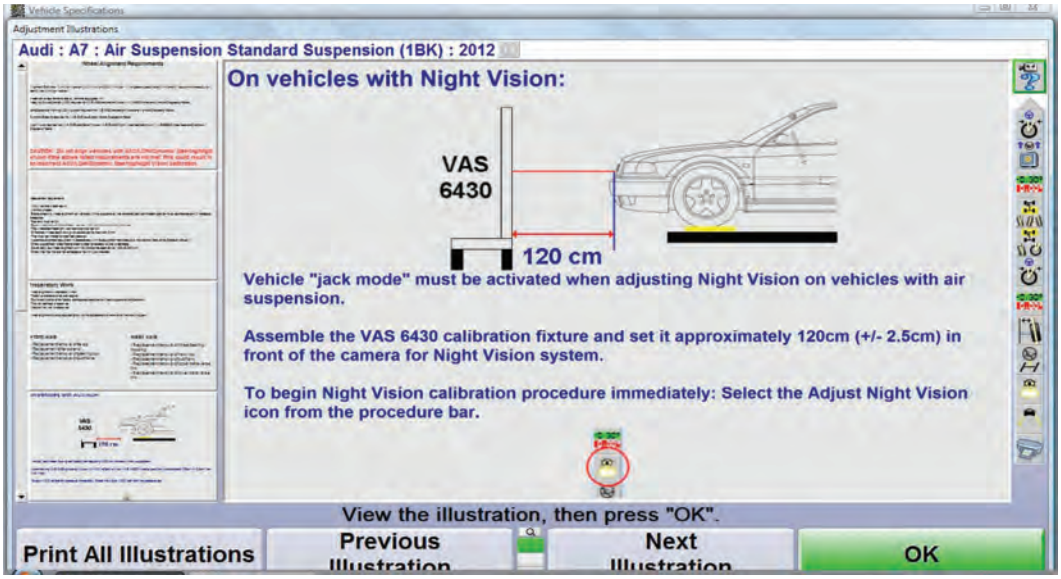
LDW set-up screen

Note the icon for direct calibration.

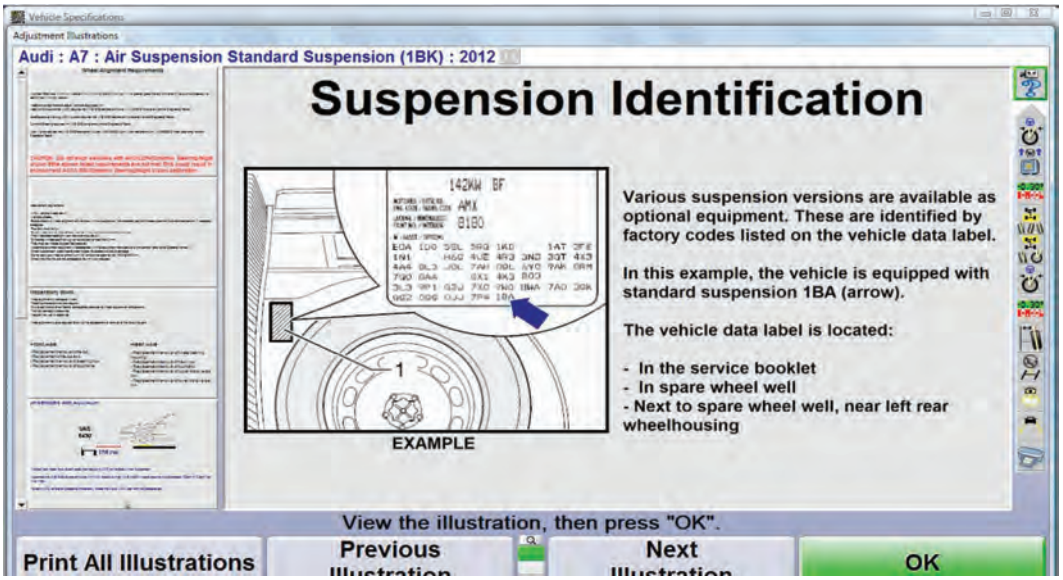

Audi : A7 : Air Suspension Standard Suspension (1BK) : 2012
On vehicles with Lane Departure Warning (LDW):
VAS 6430
150 cm
Assemble the VAS 6430 calibration fixture and set it approximately 150cm +/- 2.5cm ahead of the vehicles front axle centerline.
To begin LDW calibration procedure immediately: Select the Calibrate LDW icon from the procedure bar.
View the illustration, then press "OK".
Print All Illustrations
Previous Illustration
Next Illustration
OK

Stage One: Pre-Alignment Procedures

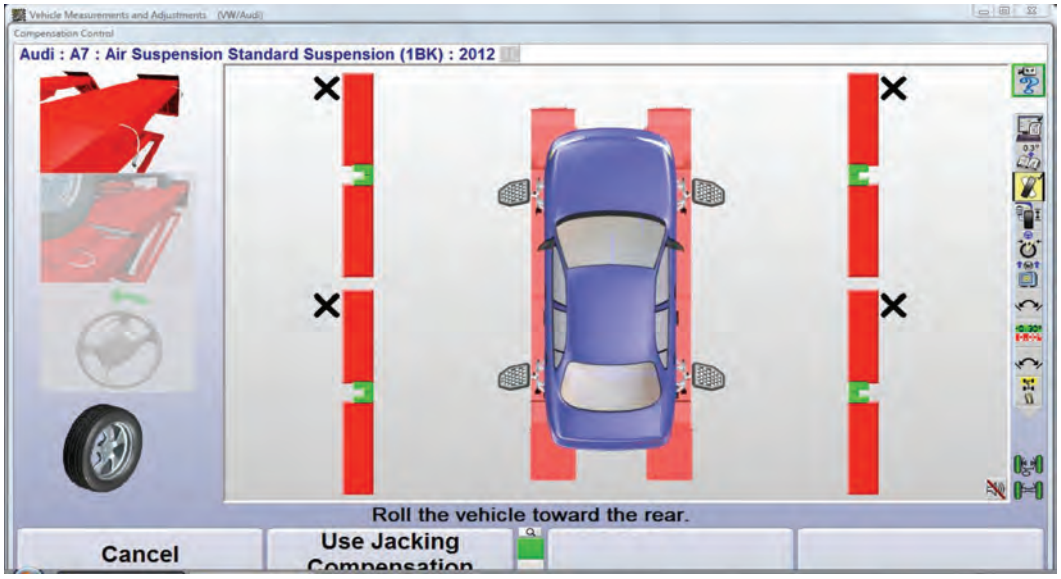
Night Vision Assist set-up screen


Audi : A7 : Air Suspension Standard Suspension (1BK) : 2012
On vehicles with Night Vision:
VAS 6430
120 cm
Vehicle "jack mode" must be activated when adjusting Night Vision on vehicles with air suspension.
Assemble the VAS 6430 calibration fixture and set it approximately 120cm (+/- 2.5cm) in front of the camera for Night Vision system.
To begin Night Vision calibration procedure immediately: Select the Adjust Night Vision icon from the procedure bar.
View the illustration, then press "OK".
Print All Illustrations
Previous Illustration
Next Illustration
OK

Suspension Identification


Audi : A7 : Air Suspension Standard Suspension (1BK) : 2012
Suspension Identification
EXAMPLE
Various suspension versions are available as optional equipment. These are identified by factory codes listed on the vehicle data label.
In this example, the vehicle is equipped with standard suspension 1BA (arrow).
The vehicle data label is located:
- In the service booklet
- In spare wheel well
- Next to spare wheel well, near left rear wheelhousing
View the illustration, then press "OK".
Print All Illustrations
Previous Illustration
Next Illustration
OK

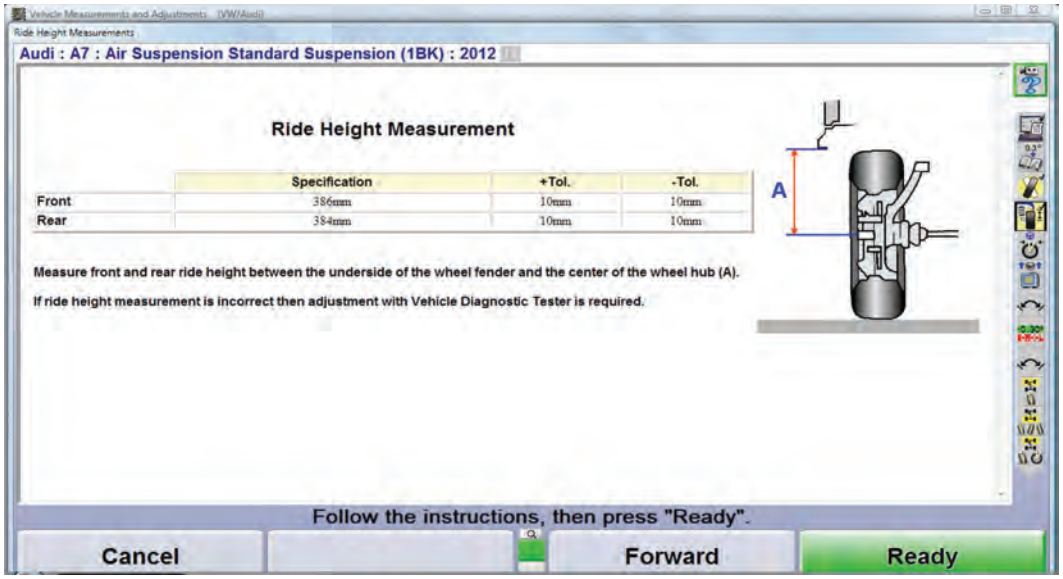
Compensation



Stage One: Pre-Alignment Procedures

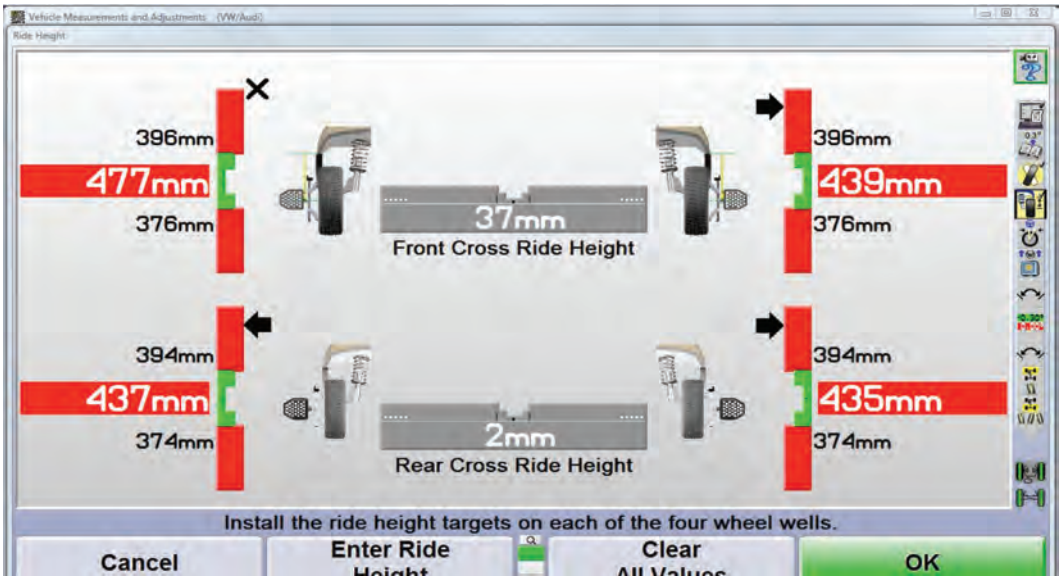
Ride Height

Ride height can be done manually with a tape measure or with the live ride height targets.



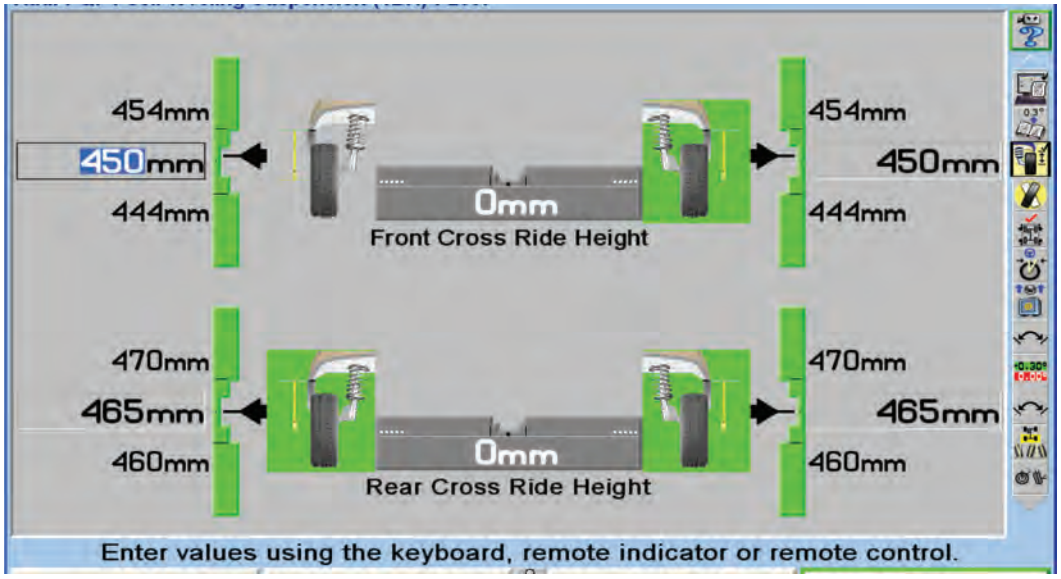
Live Ride Height Measurements using Targets

This screen is live and will track the measurements of the vehicle as it is moved. These are the measurements will be entered in the Scan Tool.



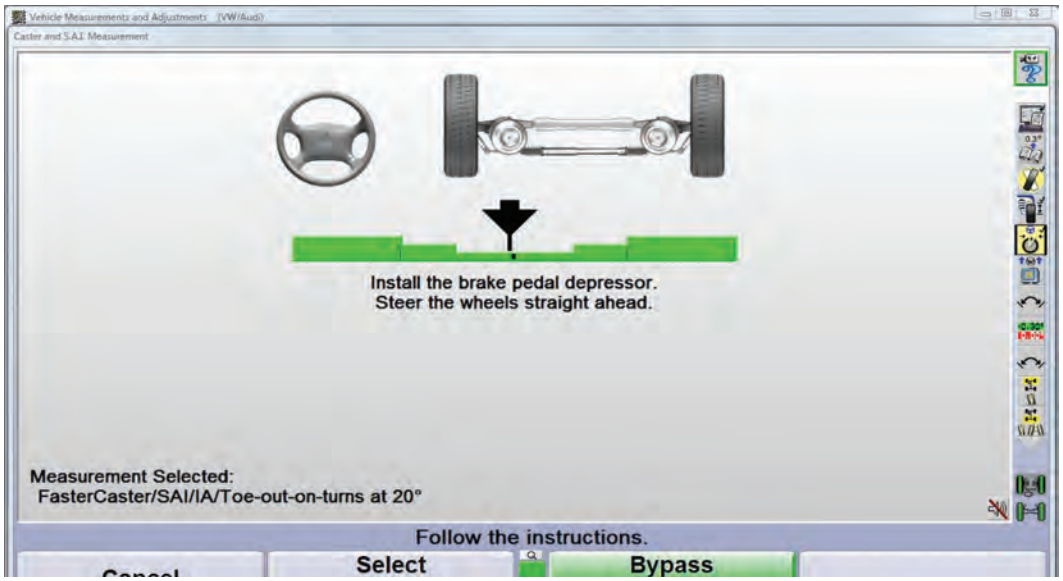
Proper Ride Height Established

The Scan Tool will place the car in jack mode until the process is complete. The alignment and calibrations can now begin.

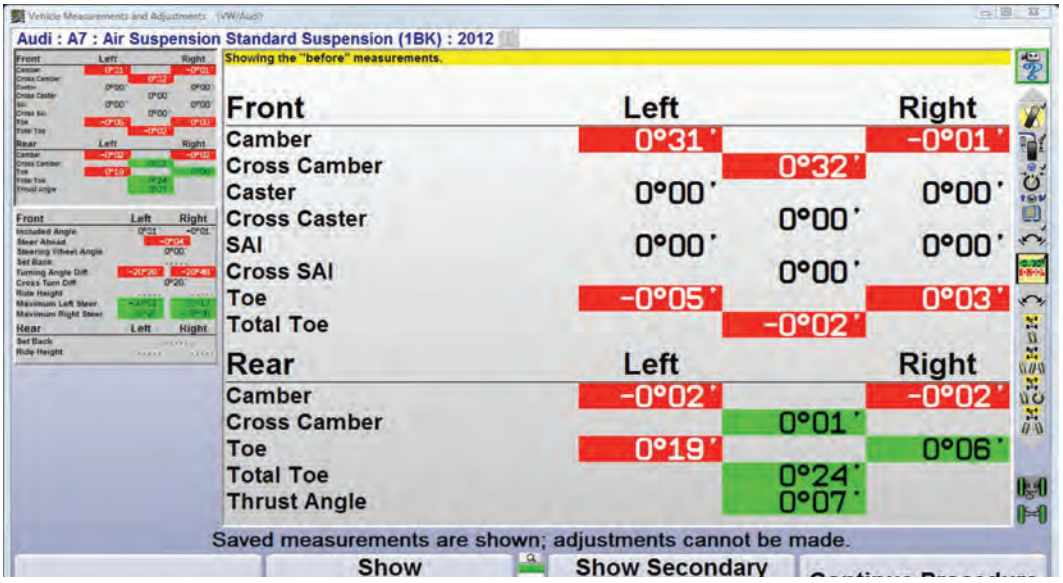


Alignment

Perform Caster, SAI, I/A, TOOT @ 20 and Max steer measurements.



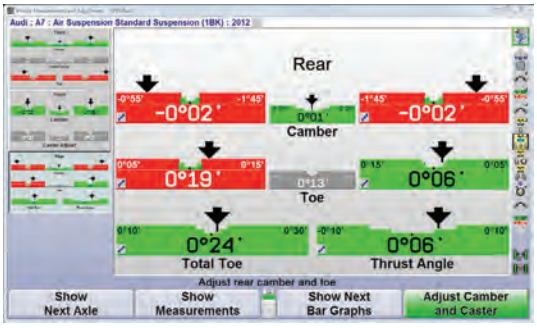
Alignment measurements will be displayed after steers are complete. Press <Continue Procedure> and answer Yes if adjustments are needed.

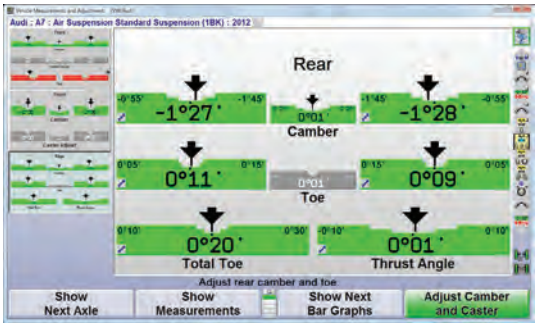


Alignment software will take you to the first necessary adjustment – in this case – front camber. The software then prompts you to adjust the rear values.

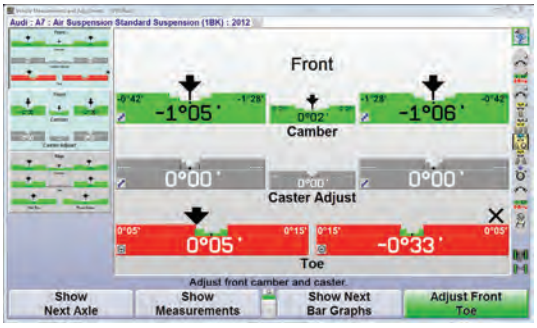
Stage Two: Alignment

Correct rear values beginning with camber, then rear toe. When rear adjustments are complete, the software returns you to the front bar measurements.

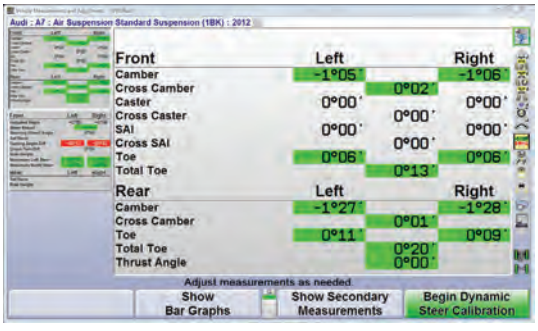




At this point, adjust the front toe.



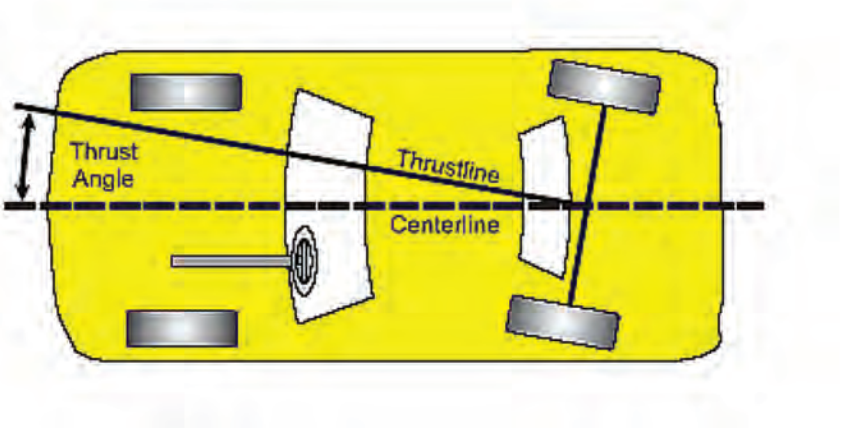
After front toe is adjusted, re-measure caster, check the measurement screen to insure all measurements are within specification, then proceed to the calibrations.



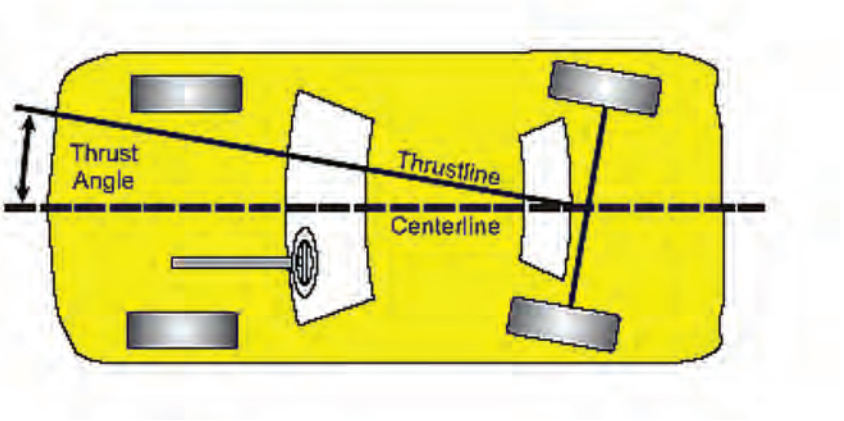
All driver assist modules rely on a good base alignment.

All modules calibrated with the VAS 6430 fixture are aligned with the thrust angle.

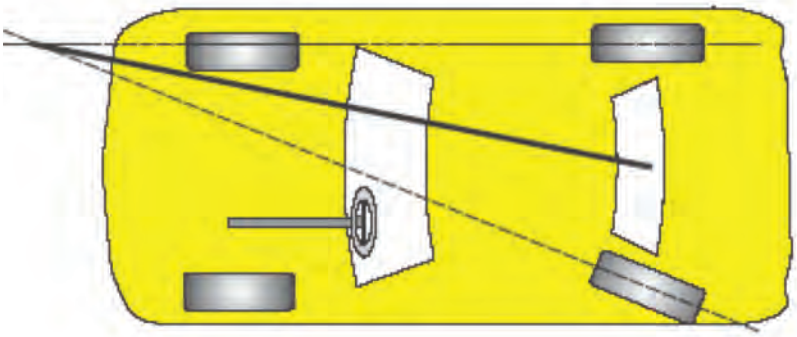
Thrust angle is formed by the intersection of the geometric centerline and the thrust line.



Geometric centerline is a line drawn between the midpoint of both front wheels and both rear wheels.

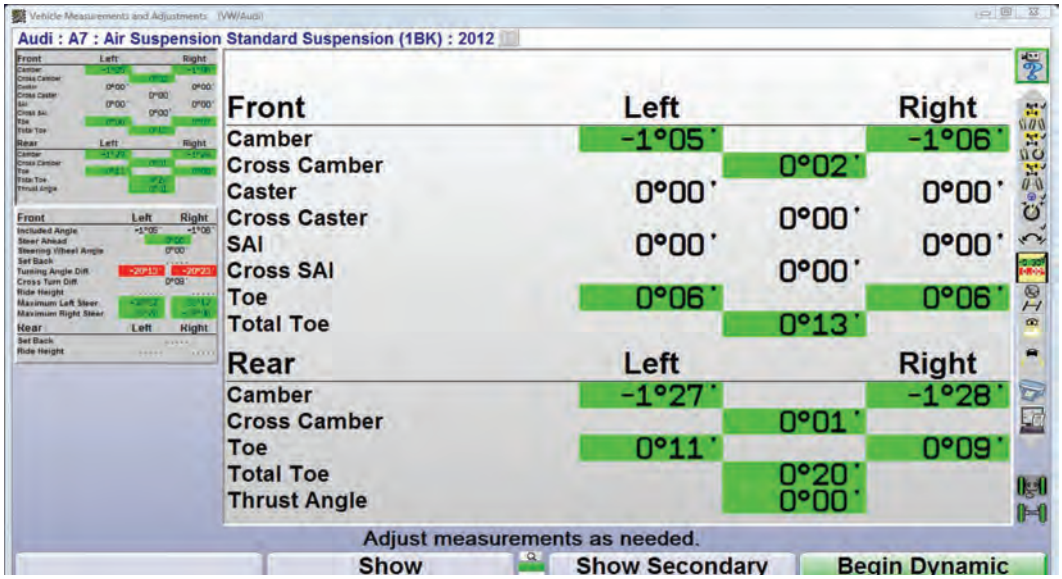


Thrust line is the bisector of rear total toe. Also described as the direction the rear wheels are pushing the vehicle.



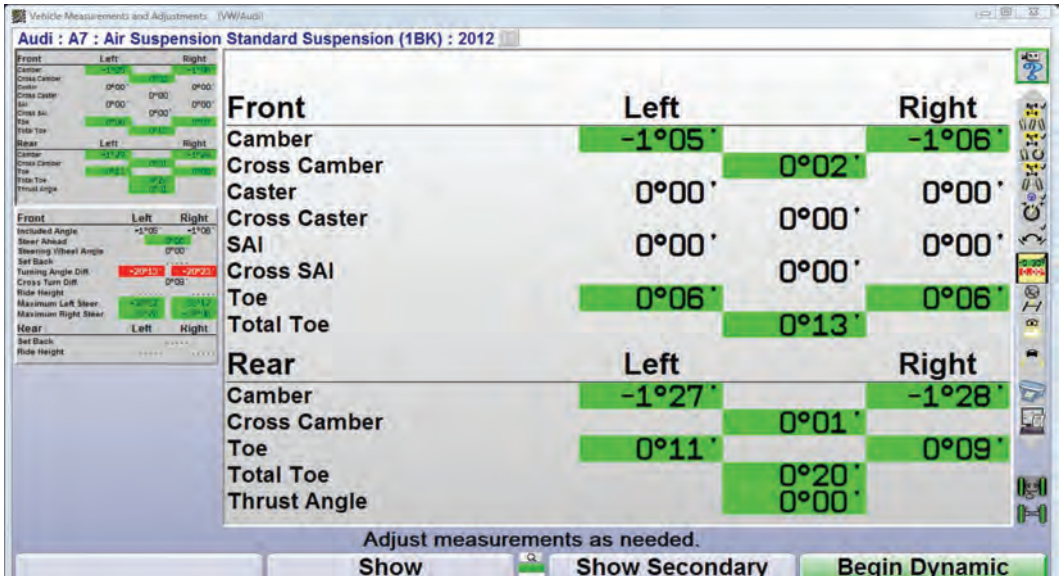
Stage Two: Alignment

After the car has been made geometrically correct, it is time to begin stage three. The post- alignment calibrations are performed next.



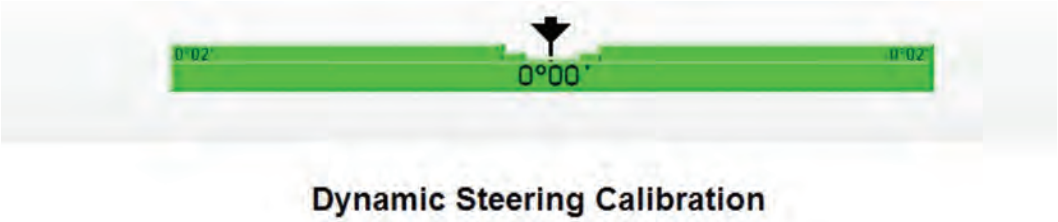
Dynamic Steering Calibration

The alignment software will guide you through the process.



See SSP 992803, Audi Dynamic Steering System, for more information.

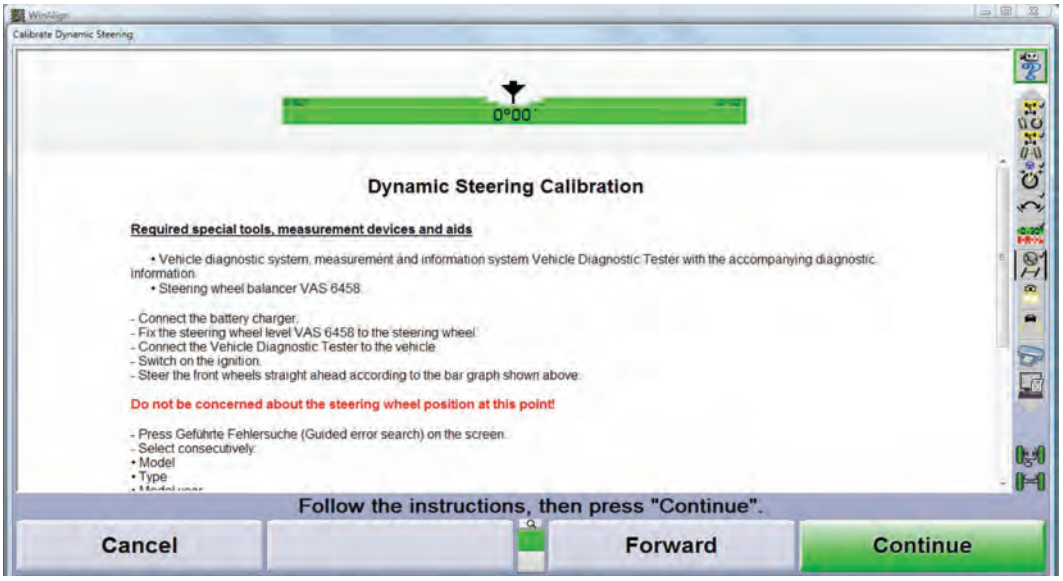
Press <Begin Dynamic Steer Calibration>. You will see a bar graph at the top center of the screen. This is the Steer Ahead position which represents the direction the car will steer to when going straight.



Dynamic Steering Calibration

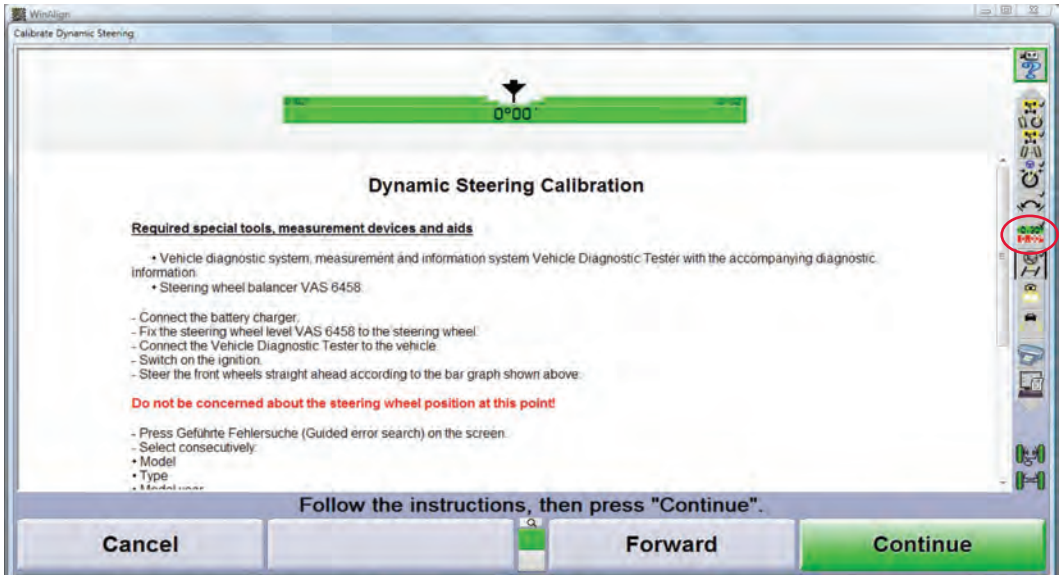
This screen will give you the instructions for the initial setup and must remain on during the entire calibration process.

DO NOT PRESS <Continue> UNTIL THE CALIBRATION IS FINISHED!

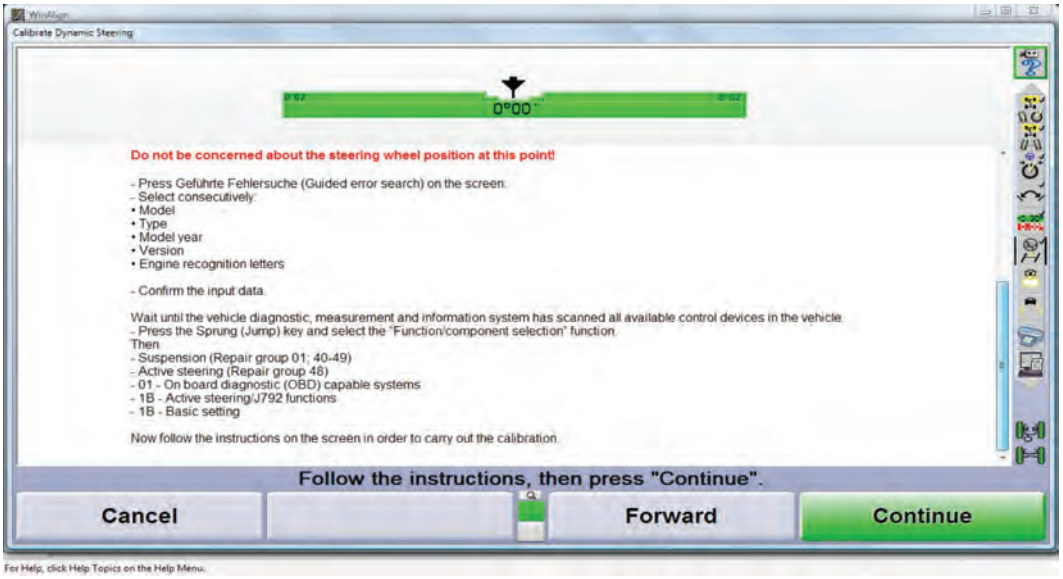

Calibrate Dynamic Steering
0°00'
Dynamic Steering Calibration
Required special tools, measurement devices and aids
• Vehicle diagnostic system, measurement and information system Vehicle Diagnostic Tester with the accompanying diagnostic information
• Steering wheel balancer VAS 6458
- Connect the battery charger.
- Fix the steering wheel level VAS 6458 to the steering wheel.
- Connect the Vehicle Diagnostic Tester to the vehicle.
- Switch on the ignition.
- Steer the front wheels straight ahead according to the bar graph shown above.
Do not be concerned about the steering wheel position at this point!
- Press Geführte Fehlersuche (Guided error search) on the screen.
- Select consecutively:
• Model
• Type
Follow the instructions, then press "Continue".
Cancel
Forward
Continue

Stage Three: Post Alignment

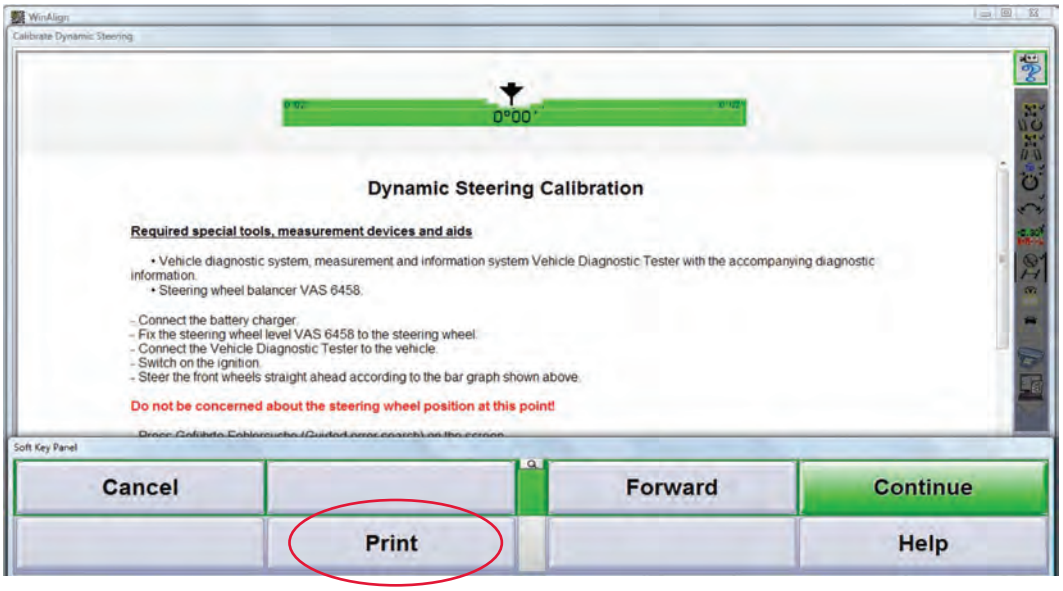
Use the mouse to guide the slide bar on the right to view the full instruction page.


WinAlign
Calibrate Dynamic Steering
0°00'
Dynamic Steering Calibration
Required special tools, measurement devices and aids
• Vehicle diagnostic system, measurement and information system Vehicle Diagnostic Tester with the accompanying diagnostic information
• Steering wheel balancer VAS 6458
- Connect the battery charger.
- Fix the steering wheel level VAS 6458 to the steering wheel.
- Connect the Vehicle Diagnostic Tester to the vehicle.
- Switch on the ignition.
- Steer the front wheels straight ahead according to the bar graph shown above.
Do not be concerned about the steering wheel position at this point!
- Press Geführte Fehlersuche (Guided error search) on the screen.
- Select consecutively:
• Model
• Type
Follow the instructions, then press "Continue".
Cancel
Forward
Continue

Bottom of instruction screen.


WinAlign
Calibrate Dynamic Steering
0°00'
Do not be concerned about the steering wheel position at this point!
- Press Geführte Fehlersuche (Guided error search) on the screen.
- Select consecutively:
• Model
• Type
• Model year
• Version
• Engine recognition letters
- Confirm the input data.
Wait until the vehicle diagnostic, measurement and information system has scanned all available control devices in the vehicle.
- Press the Sprung (Jump) key and select the "Function/component selection" function.
Then:
- Suspension (Repair group 01; 40-49)
- Active steering (Repair group 48)
- 01 - On board diagnostic (OBD) capable systems
- 1B - Active steering/J792 functions
- 1B - Basic setting
Now follow the instructions on the screen in order to carry out the calibration.
Follow the instructions, then press "Continue".
Cancel
Forward
Continue
For Help, click Help Topics on the Help Menu.

You can also print the instructions by using the lower level of soft keys and pressing <K2>.

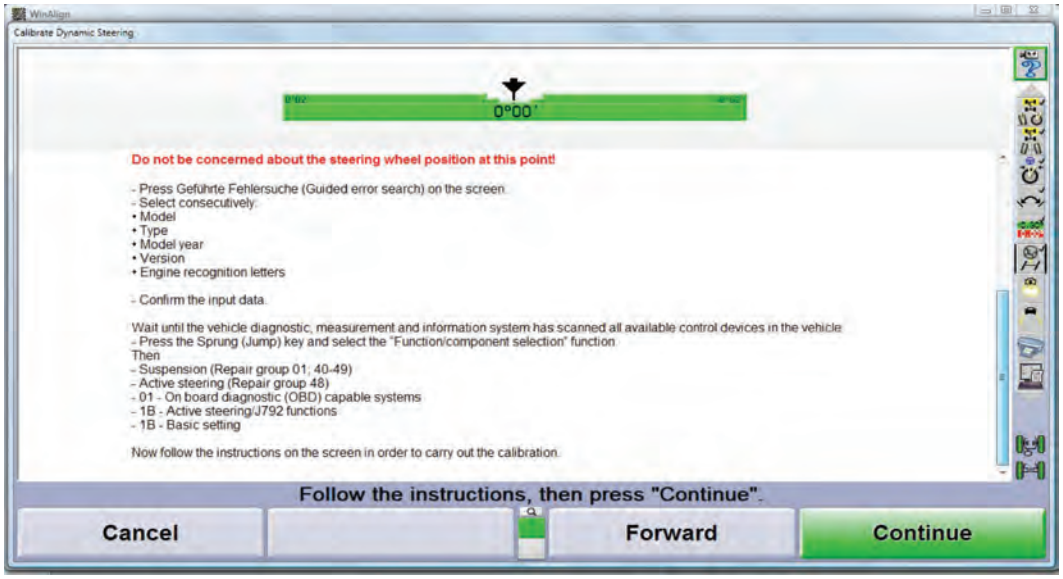

WinAlign
Calibrate Dynamic Steering
0°00'
Dynamic Steering Calibration
Required special tools, measurement devices and aids
• Vehicle diagnostic system, measurement and information system Vehicle Diagnostic Tester with the accompanying diagnostic information
• Steering wheel balancer VAS 6458
- Connect the battery charger.
- Fix the steering wheel level VAS 6458 to the steering wheel.
- Connect the Vehicle Diagnostic Tester to the vehicle.
- Switch on the ignition.
- Steer the front wheels straight ahead according to the bar graph shown above.
Do not be concerned about the steering wheel position at this point!
Soft Key Panel
Cancel
Forward
Continue
Print
Help

Stage Three: Post Alignment

Install the VAS 6458 steering wheel level.

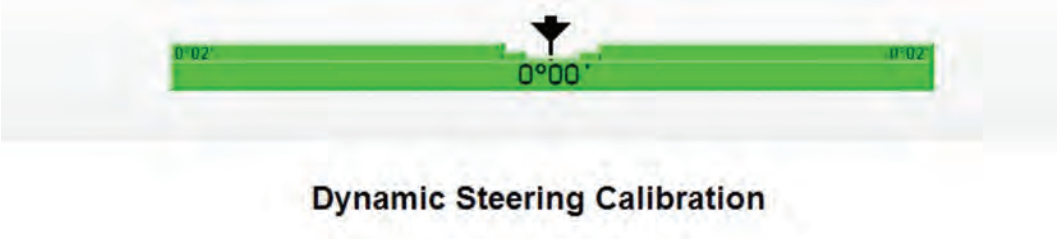
Select Basic Setting in Guided Fault Finding (Address Word 1B).

Follow the Scan Tool instructions. READ AND FOLLOW ALL INSTRUCTIONS.


Calibrate Dynamic Steering
0°00'
Do not be concerned about the steering wheel position at this point!
- Press Geführte Fehlersuche (Guided error search) on the screen
- Select consecutively:
• Model
• Type
• Model year
• Version
• Engine recognition letters
- Confirm the input data.
Wait until the vehicle diagnostic, measurement and information system has scanned all available control devices in the vehicle
- Press the Sprung (Jump) key and select the "Function/component selection" function
Then
- Suspension (Repair group 01; 40-49)
- Active steering (Repair group 48)
- 01 - On board diagnostic (OBD) capable systems
- 1B - Active steering/J792 functions
- 1B - Basic setting
Now follow the instructions on the screen in order to carry out the calibration.
Follow the instructions, then press "Continue".
Cancel
Forward
Continue

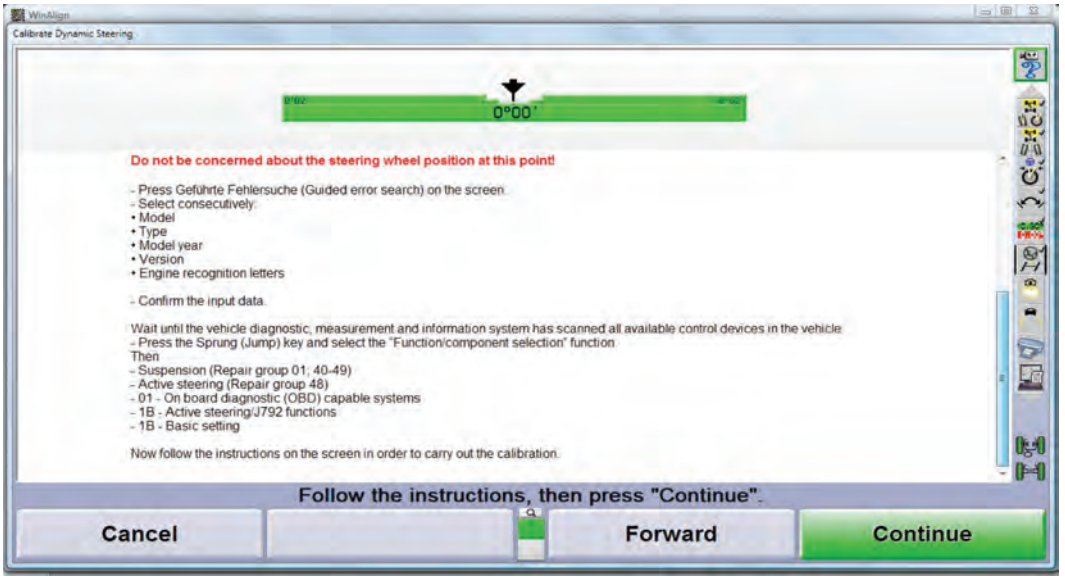
Use this graph when instructed to use the wheel alignment equipment.

You will use the VAS 6458 level when instructed to use the steering wheel calibration tool.



Dynamic Steering Calibration

Press <Continue> when the process is complete.


Calibrate Dynamic Steering
0°00'
Do not be concerned about the steering wheel position at this point!
- Press Geführte Fehlersuche (Guided error search) on the screen
- Select consecutively:
• Model
• Type
• Model year
• Version
• Engine recognition letters
- Confirm the input data.
Wait until the vehicle diagnostic, measurement and information system has scanned all available control devices in the vehicle
- Press the Sprung (Jump) key and select the "Function/component selection" function
Then
- Suspension (Repair group 01; 40-49)
- Active steering (Repair group 48)
- 01 - On board diagnostic (OBD) capable systems
- 1B - Active steering/J792 functions
- 1B - Basic setting
Now follow the instructions on the screen in order to carry out the calibration.
Follow the instructions, then press "Continue".
Cancel
Forward
Continue

Night Vision Assist

For more information see SSP 970203, The 2011 Audi A8 Driver Assistance Systems.

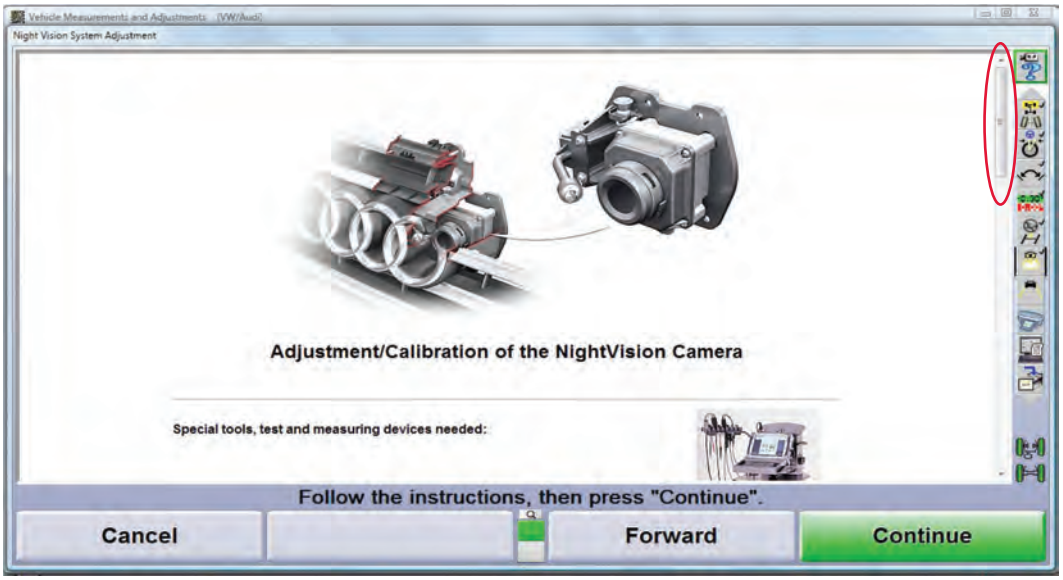
Address Word 84.

Switch for Night Vision.

Headlights must be on for Night Vision to operate.

Screen One Instructions

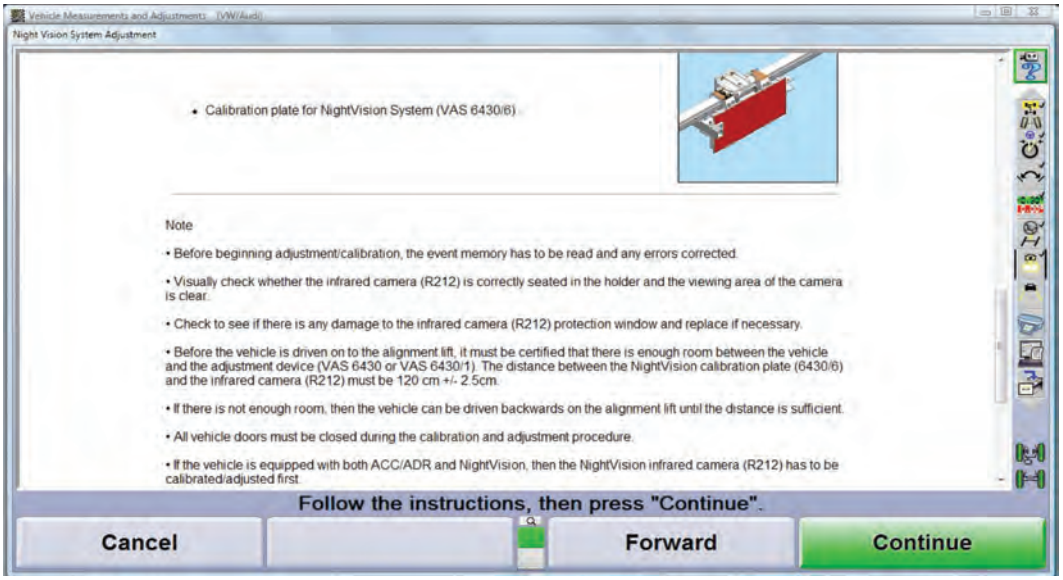
Use scroll bar to view page.



Needed tools are listed here:
VAS 6430/6
VAS 6350/3

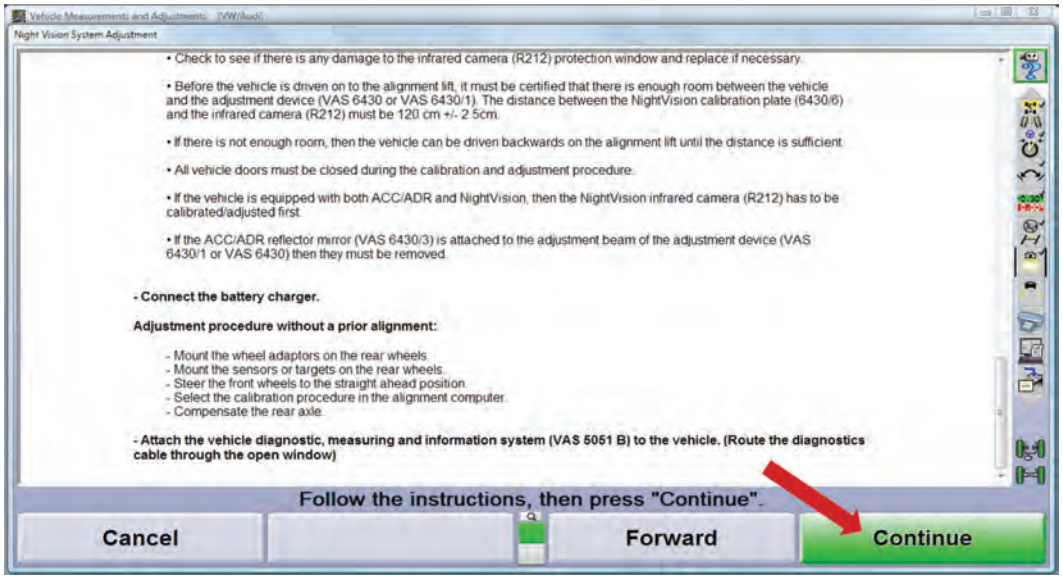
Vehicle Measurements and Adjustments (VW/Audi)
Night Vision System Adjustment
Special tools, test and measuring devices needed:
• Vehicle diagnostics system, measuring and information system (VAS 5051 B) and the diagnostics manual belonging to this system.
• Basic Adjustment device (VAS 6430/1) or the Adjustment device (VAS 6430).
• Line laser (VAS 6350/3)
Follow the instructions, then press "Continue".
Cancel
Forward
Continue

The Note points out that the night vision calibration has to be done BEFORE ACC and LDW are calibrated.


Vehicle Measurements and Adjustments (VW/Audi)
Night Vision System Adjustment
• Calibration plate for NightVision System (VAS 6430/6)
Note
• Before beginning adjustment/calibration, the event memory has to be read and any errors corrected.
• Visually check whether the infrared camera (R212) is correctly seated in the holder and the viewing area of the camera is clear.
• Check to see if there is any damage to the infrared camera (R212) protection window and replace if necessary.
• Before the vehicle is driven on to the alignment lift, it must be certified that there is enough room between the vehicle and the adjustment device (VAS 6430 or VAS 6430/1). The distance between the NightVision calibration plate (6430/6) and the infrared camera (R212) must be 120 cm +/- 2.5cm.
• If there is not enough room, then the vehicle can be driven backwards on the alignment lift until the distance is sufficient.
• All vehicle doors must be closed during the calibration and adjustment procedure.
• If the vehicle is equipped with both ACC/ADR and NightVision, then the NightVision infrared camera (R212) has to be calibrated/adjusted first.
Follow the instructions, then press "Continue".
Cancel
Forward
Continue

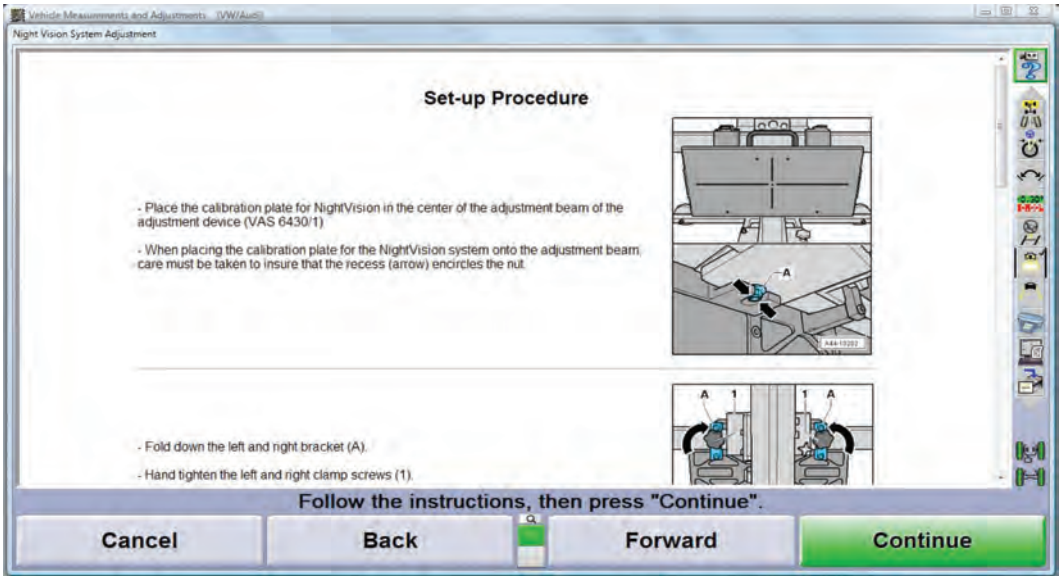
Stage Three: Night Vision

After reading and completing all instructions, press <Continue>.

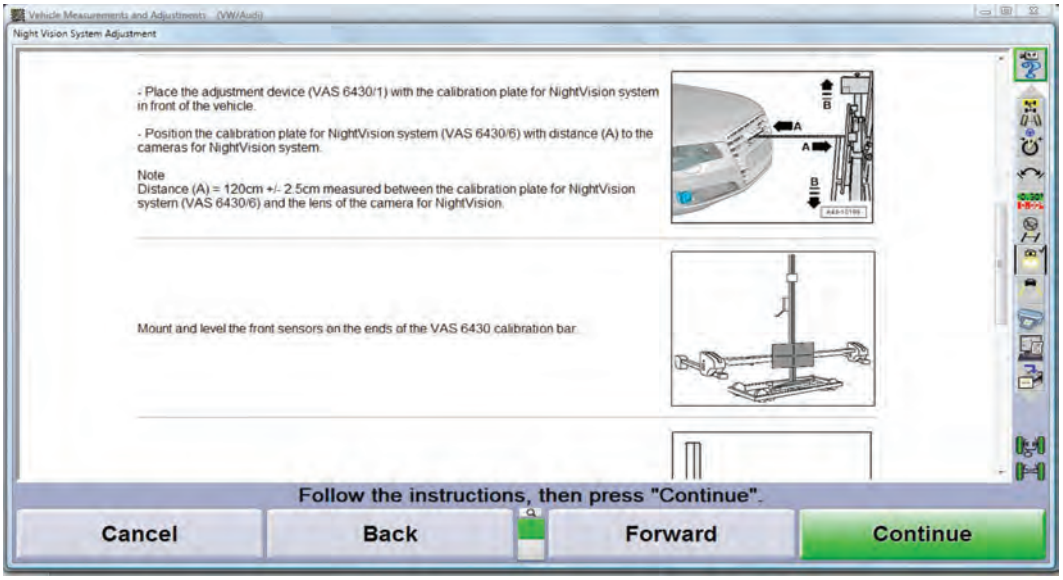

Vehicle Measurements and Adjustments [VW/Audi]
Night Vision System Adjustment
• Check to see if there is any damage to the infrared camera (R212) protection window and replace if necessary.
• Before the vehicle is driven on to the alignment lift, it must be certified that there is enough room between the vehicle and the adjustment device (VAS 6430 or VAS 6430/1). The distance between the NightVision calibration plate (6430/6) and the infrared camera (R212) must be 120 cm +/- 2.5cm.
• If there is not enough room, then the vehicle can be driven backwards on the alignment lift until the distance is sufficient.
• All vehicle doors must be closed during the calibration and adjustment procedure.
• If the vehicle is equipped with both ACC/ADR and NightVision, then the NightVision infrared camera (R212) has to be calibrated/adjusted first.
• If the ACC/ADR reflector mirror (VAS 6430/3) is attached to the adjustment beam of the adjustment device (VAS 6430/1 or VAS 6430) then they must be removed.
- Connect the battery charger.
Adjustment procedure without a prior alignment:
- Mount the wheel adaptors on the rear wheels.
- Mount the sensors or targets on the rear wheels.
- Steer the front wheels to the straight ahead position.
- Select the calibration procedure in the alignment computer.
- Compensate the rear axle.
- Attach the vehicle diagnostic, measuring and information system (VAS 5051 B) to the vehicle. (Route the diagnostics cable through the open window)
Follow the instructions, then press "Continue".
Cancel
Forward
Continue

Screen Two Instructions

Set Up VAS 6430/6 and 6350/3 to calibrate the night vision camera.

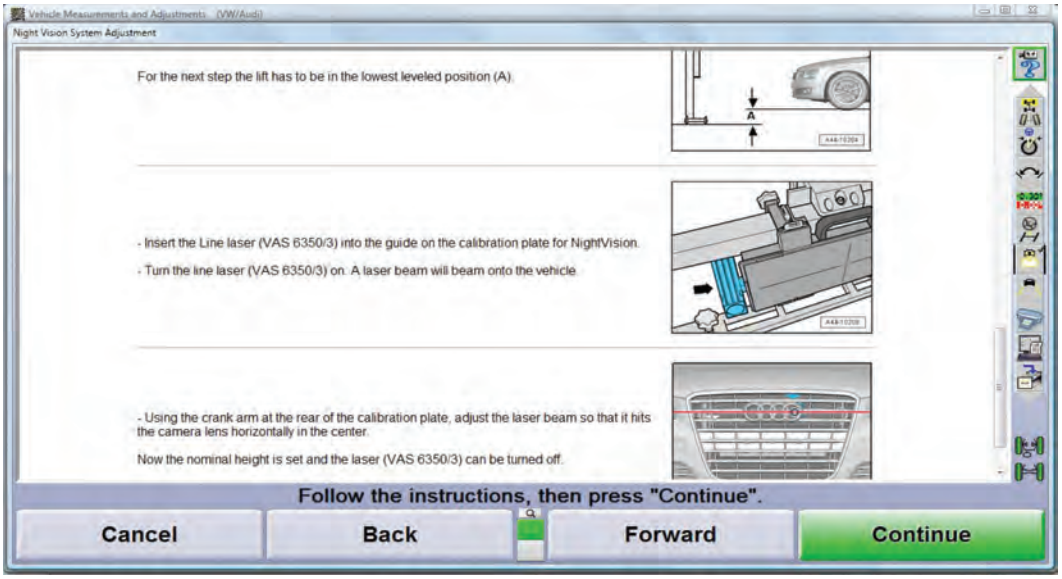

Vehicle Measurements and Adjustments [VW/Audi]
Night Vision System Adjustment
Set-up Procedure
- Place the calibration plate for NightVision in the center of the adjustment beam of the adjustment device (VAS 6430/1).
- When placing the calibration plate for the NightVision system onto the adjustment beam, care must be taken to insure that the recess (arrow) encircles the nut.
- Fold down the left and right bracket (A).
- Hand tighten the left and right clamp screws (1).
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Set up VAS 6430/6 120 cm +/- 2.5 cm from night vision camera.


Vehicle Measurements and Adjustments [VW/Audi]
Night Vision System Adjustment
- Place the adjustment device (VAS 6430/1) with the calibration plate for NightVision system in front of the vehicle.
- Position the calibration plate for NightVision system (VAS 6430/6) with distance (A) to the cameras for NightVision system.
Note
Distance (A) = 120cm +/- 2.5cm measured between the calibration plate for NightVision system (VAS 6430/6) and the lens of the camera for NightVision.
Mount and level the front sensors on the ends of the VAS 6430 calibration bar.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Use VAS 6350/3 laser to set height of the VAS 6430/6 fixture.

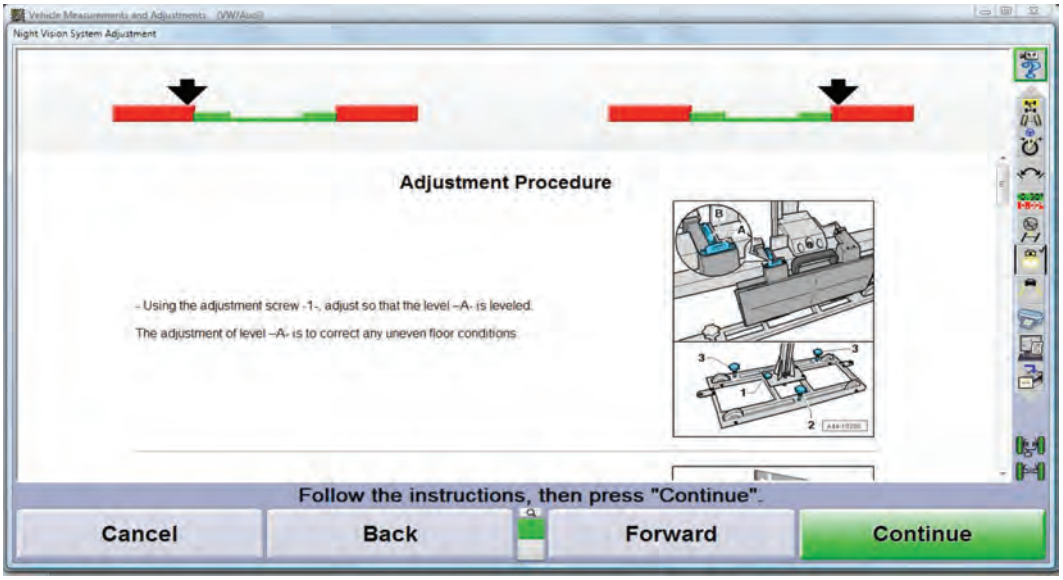
Press <Continue> when finished.


Vehicle Measurements and Adjustments (VW/Audi)
Night Vision System Adjustment
For the next step the lift has to be in the lowest leveled position (A).
A
- Insert the Line laser (VAS 6350/3) into the guide on the calibration plate for NightVision.
- Turn the line laser (VAS 6350/3) on. A laser beam will beam onto the vehicle.
- Using the crank arm at the rear of the calibration plate, adjust the laser beam so that it hits the camera lens horizontally in the center.
Now the nominal height is set and the laser (VAS 6350/3) can be turned off.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

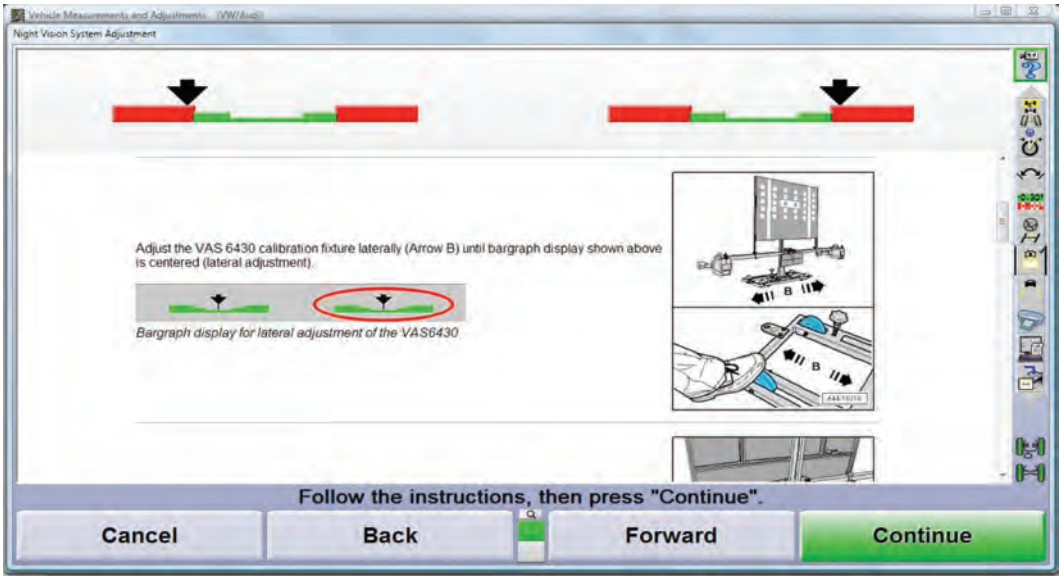
Screen Three Instructions

(also calibration screen)

First level fixture using the adjusters an levels on the backside of VAS 6430/6.


Vehicle Measurements and Adjustments (VW/Audi)
Night Vision System Adjustment
Adjustment Procedure
- Using the adjustment screw -1-, adjust so that the level –A- is leveled.
The adjustment of level –A- is to correct any uneven floor conditions.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

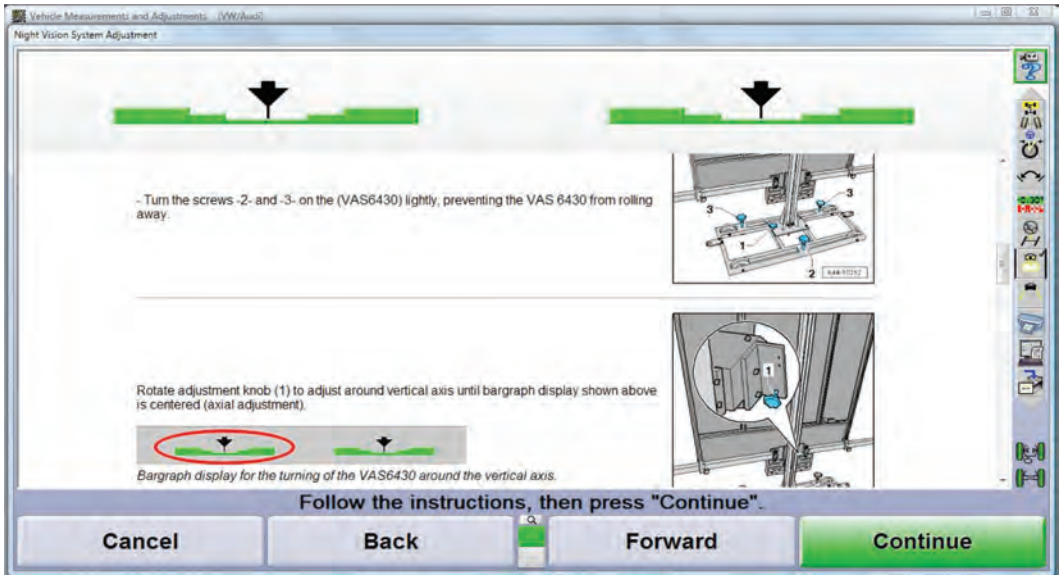
Move fixture side to side until right arrow in bar graph is centered in green.


Vehicle Measurements and Adjustments (VW/Audi)
Night Vision System Adjustment
Adjust the VAS 6430 calibration fixture laterally (Arrow B) until bargraph display shown above is centered (lateral adjustment).
Bargraph display for lateral adjustment of the VAS6430
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

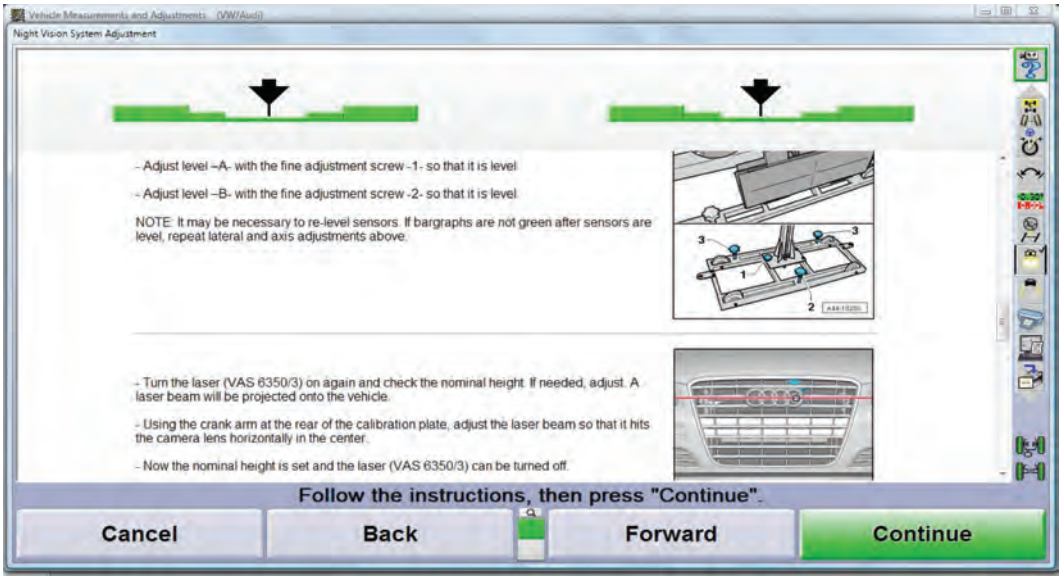
Stage Three: Night Vision

Turn the vertical axis knob on the backside of the 6430/6 until the left bar graph is green. It may take some time to get this in the correct position.

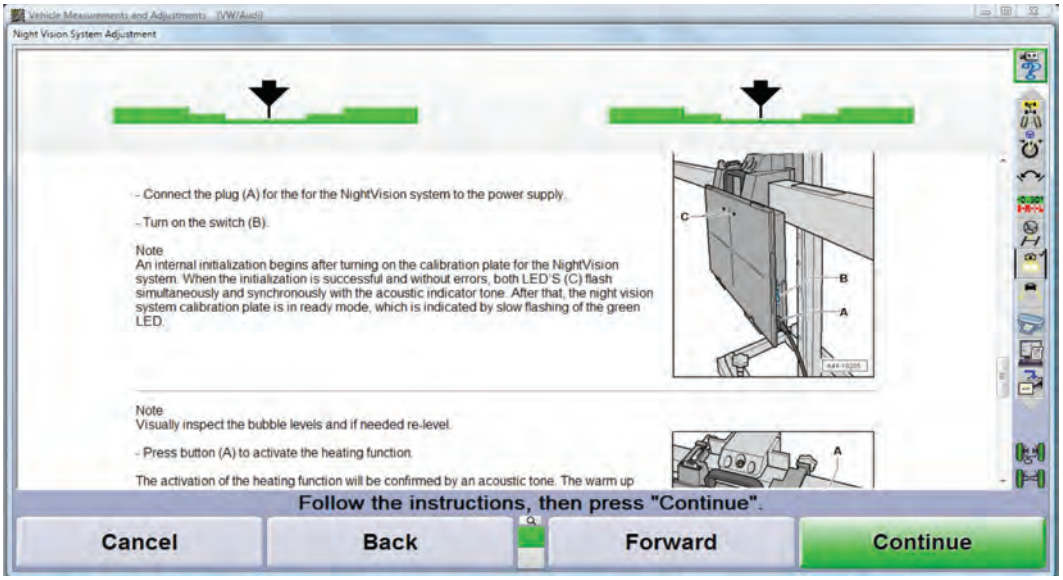
The fixture is now in the correct position for both Night vision and ACC calibration.


Vehicle Measurements and Adjustments (VW/Audi)
Night Vision System Adjustment
- Turn the screws -2- and -3- on the (VAS6430) lightly, preventing the VAS 6430 from rolling away.
Rotate adjustment knob (1) to adjust around vertical axis until bargraph display shown above is centered (axial adjustment).
Bargraph display for the turning of the VAS6430 around the vertical axis.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

With the fixture is in it's final position, re-level the VAS 6430/6 for the final time. Be sure the VAS 6350/3 is centered on the Night Vision camera.

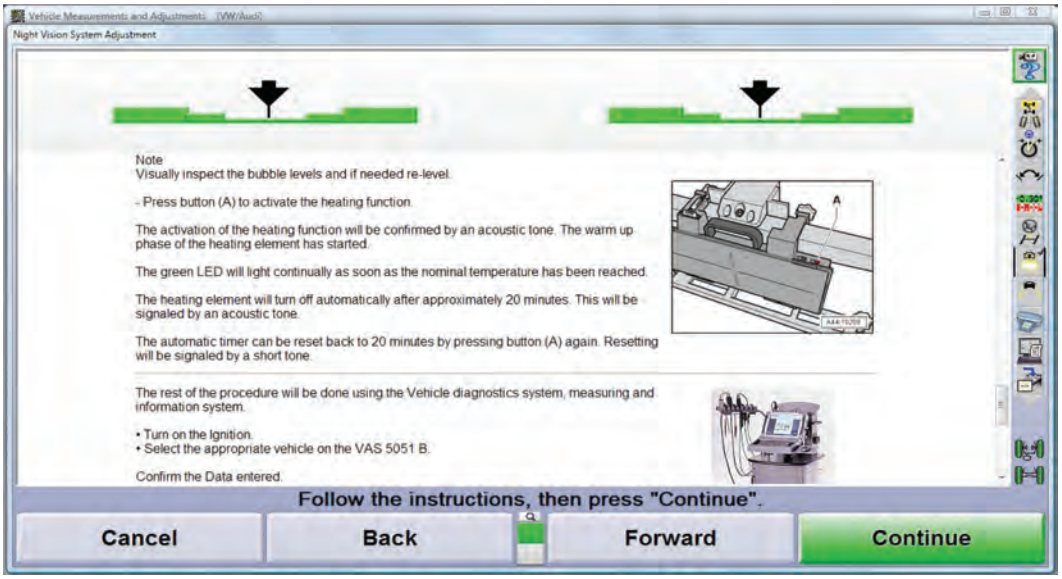

Vehicle Measurements and Adjustments (VW/Audi)
Night Vision System Adjustment
- Adjust level –A- with the fine adjustment screw -1- so that it is level.
- Adjust level –B- with the fine adjustment screw -2- so that it is level.
NOTE: It may be necessary to re-level sensors. If bargraphs are not green after sensors are level, repeat lateral and axis adjustments above.
- Turn the laser (VAS 6350/3) on again and check the nominal height. If needed, adjust. A laser beam will be projected onto the vehicle.
- Using the crank arm at the rear of the calibration plate, adjust the laser beam so that it hits the camera lens horizontally in the center.
- Now the nominal height is set and the laser (VAS 6350/3) can be turned off.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Plug in the VAS 6430/6 and switch on the power.


Vehicle Measurements and Adjustments (VW/Audi)
Night Vision System Adjustment
- Connect the plug (A) for the for the NightVision system to the power supply.
- Turn on the switch (B).
Note
An internal initialization begins after turning on the calibration plate for the NightVision system. When the initialization is successful and without errors, both LED'S (C) flash simultaneously and synchronously with the acoustic indicator tone. After that, the night vision system calibration plate is in ready mode, which is indicated by slow flashing of the green LED.
Note
Visually inspect the bubble levels and if needed re-level.
- Press button (A) to activate the heating function.
The activation of the heating function will be confirmed by an acoustic tone. The warm up
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

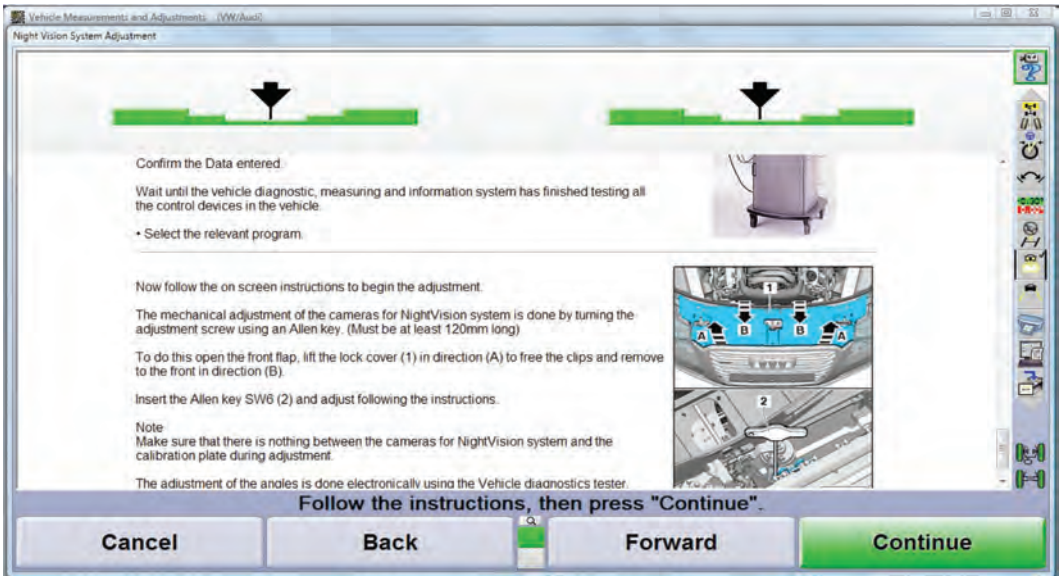
Press activation switch on top of unit and wait for the green light to turn constant, unit is ready at this point.

NOTE: Unit will switch off automatically after 20 minutes.


Vehicle Measurements and Adjustments [VW/Audi]
Night Vision System Adjustment
Note
Visually inspect the bubble levels and if needed re-level.
- Press button (A) to activate the heating function.
The activation of the heating function will be confirmed by an acoustic tone. The warm up phase of the heating element has started.
The green LED will light continually as soon as the nominal temperature has been reached.
The heating element will turn off automatically after approximately 20 minutes. This will be signaled by an acoustic tone.
The automatic timer can be reset back to 20 minutes by pressing button (A) again. Resetting will be signaled by a short tone.
The rest of the procedure will be done using the Vehicle diagnostics system, measuring and information system.
• Turn on the Ignition.
• Select the appropriate vehicle on the VAS 5051 B.
Confirm the Data entered.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

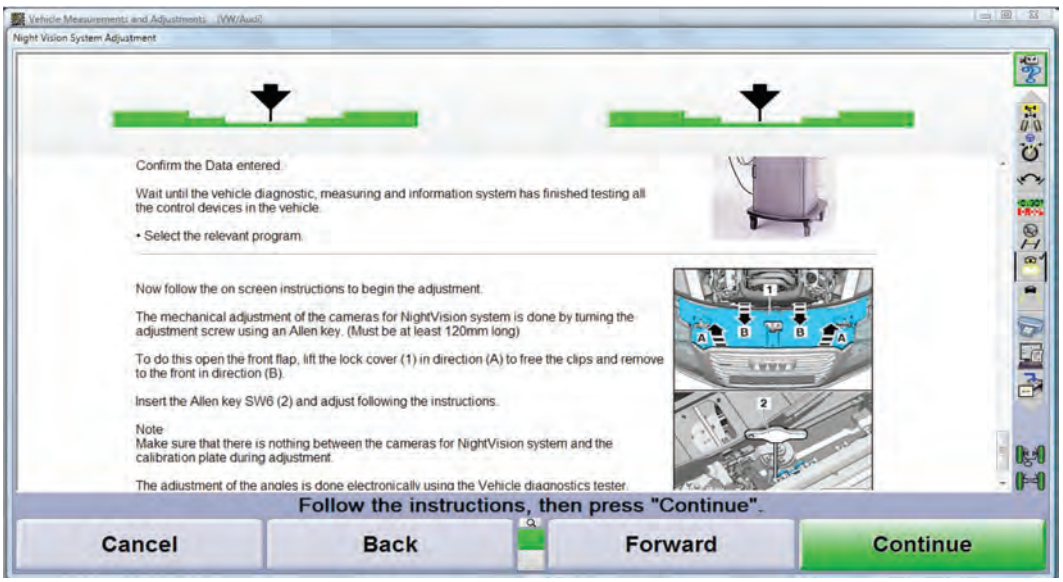
Select Basic Settings in GFF and follow the adjusting instructions.

NOTE : the removal of lock cover is necessary for adjustment. You will need a long Allen wrench or Phillips screw driver.


Vehicle Measurements and Adjustments [VW/Audi]
Night Vision System Adjustment
Confirm the Data entered.
Wait until the vehicle diagnostic, measuring and information system has finished testing all the control devices in the vehicle.
• Select the relevant program.
Now follow the on screen instructions to begin the adjustment.
The mechanical adjustment of the cameras for NightVision system is done by turning the adjustment screw using an Allen key. (Must be at least 120mm long)
To do this open the front flap, lift the lock cover (1) in direction (A) to free the clips and remove to the front in direction (B).
Insert the Allen key SW6 (2) and adjust following the instructions.
Note
Make sure that there is nothing between the cameras for NightVision system and the calibration plate during adjustment.
The adjustment of the angles is done electronically using the Vehicle diagnostics tester.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

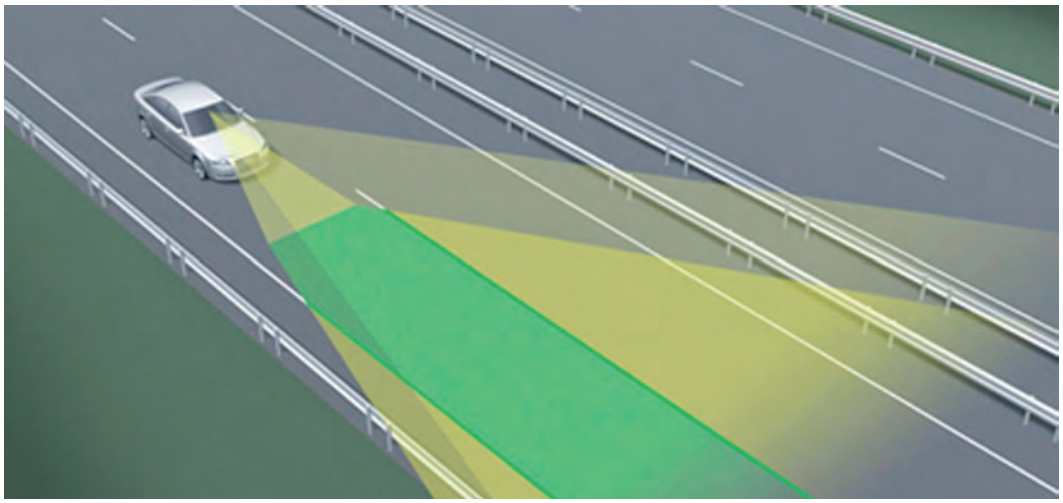
After scan tool verification has been achieved, the Night vision camera is calibrated.

Press <Continue> to calibrate the adaptive cruise control system.


Vehicle Measurements and Adjustments [VW/Audi]
Night Vision System Adjustment
Confirm the Data entered.
Wait until the vehicle diagnostic, measuring and information system has finished testing all the control devices in the vehicle.
• Select the relevant program.
Now follow the on screen instructions to begin the adjustment.
The mechanical adjustment of the cameras for NightVision system is done by turning the adjustment screw using an Allen key. (Must be at least 120mm long)
To do this open the front flap, lift the lock cover (1) in direction (A) to free the clips and remove to the front in direction (B).
Insert the Allen key SW6 (2) and adjust following the instructions.
Note
Make sure that there is nothing between the cameras for NightVision system and the calibration plate during adjustment.
The adjustment of the angles is done electronically using the Vehicle diagnostics tester.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

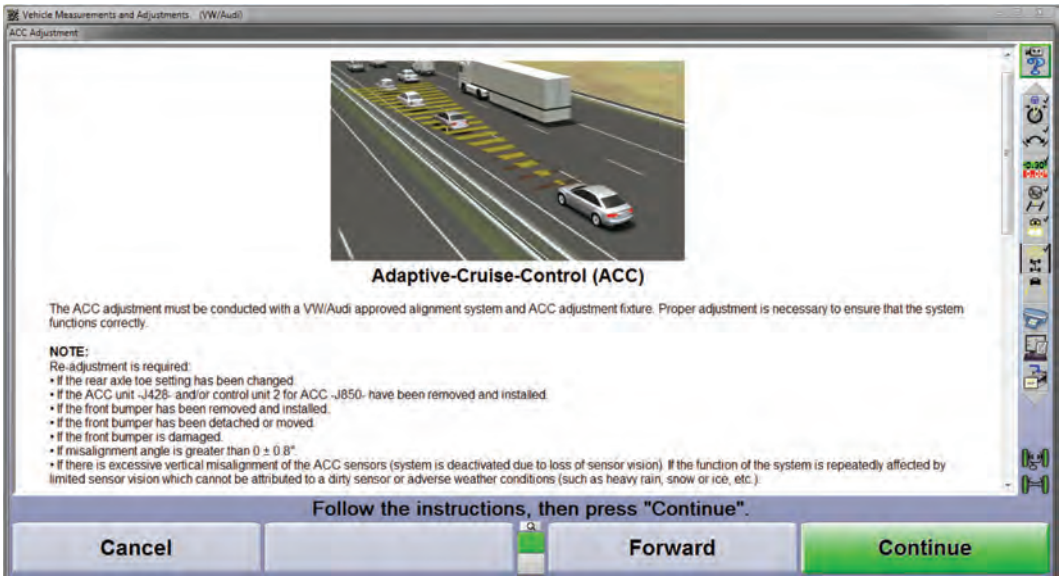
Adaptive Cruise Control

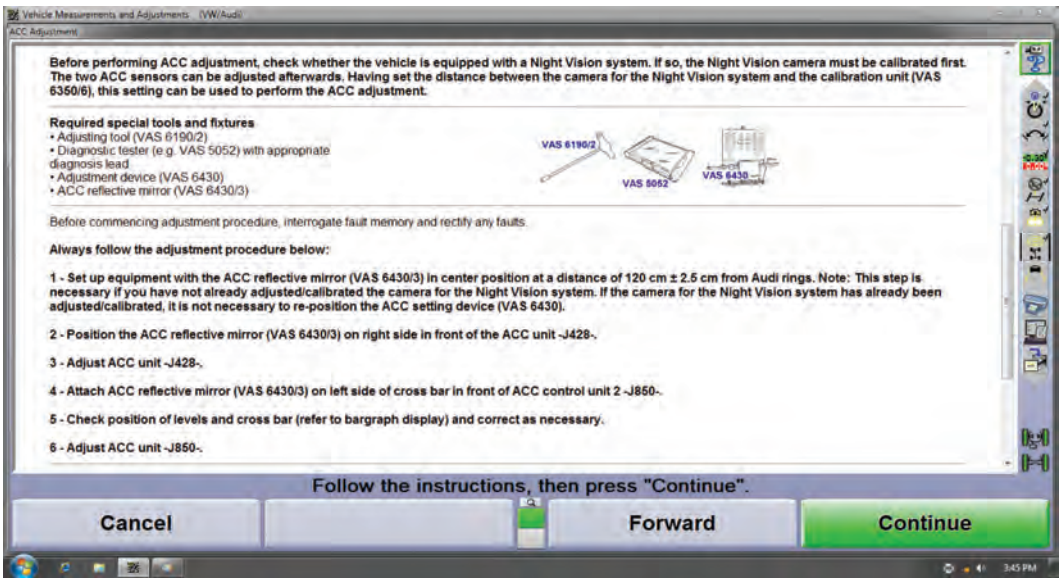
Screen One Instructions
(when calibration is necessary)



For more information see: SSP 970203, The 2011 Audi A8 Driver Assistance Systems. Address Word 13.

Stop and go feature as of model year 2012. Address Word 85.

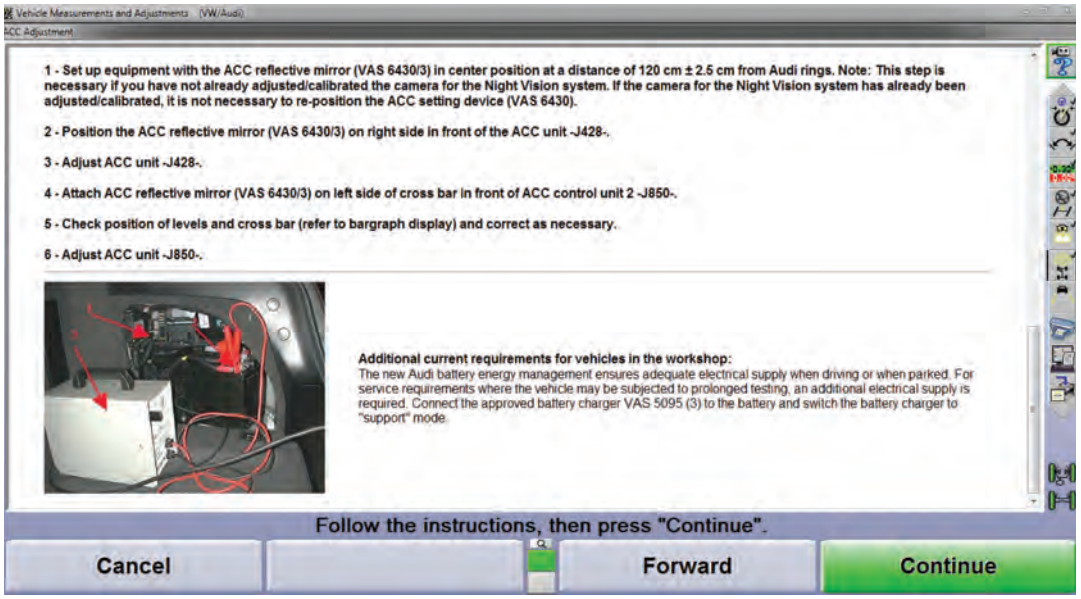

Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
Adaptive-Cruise-Control (ACC)
The ACC adjustment must be conducted with a VW/Audi approved alignment system and ACC adjustment fixture. Proper adjustment is necessary to ensure that the system functions correctly.
NOTE:
Re-adjustment is required:
• If the rear axle toe setting has been changed.
• If the ACC unit -J428- and/or control unit 2 for ACC -J850- have been removed and installed.
• If the front bumper has been removed and installed.
• If the front bumper has been detached or moved.
• If the front bumper is damaged.
• If misalignment angle is greater than 0 ± 0.8°.
• If there is excessive vertical misalignment of the ACC sensors (system is deactivated due to loss of sensor vision). If the function of the system is repeatedly affected by limited sensor vision which cannot be attributed to a dirty sensor or adverse weather conditions (such as heavy rain, snow or ice, etc.).
Follow the instructions, then press "Continue".
Cancel
Forward
Continue


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
Before performing ACC adjustment, check whether the vehicle is equipped with a Night Vision system. If so, the Night Vision camera must be calibrated first. The two ACC sensors can be adjusted afterwards. Having set the distance between the camera for the Night Vision system and the calibration unit (VAS 6350/6), this setting can be used to perform the ACC adjustment.
Required special tools and fixtures
• Adjusting tool (VAS 6190/2)
• Diagnostic tester (e.g. VAS 5052) with appropriate diagnosis lead
• Adjustment device (VAS 6430)
• ACC reflective mirror (VAS 6430/3)
VAS 6190/2
VAS 5052
VAS 6430
Before commencing adjustment procedure, interrogate fault memory and rectify any faults.
Always follow the adjustment procedure below:
1 - Set up equipment with the ACC reflective mirror (VAS 6430/3) in center position at a distance of 120 cm ± 2.5 cm from Audi rings. Note: This step is necessary if you have not already adjusted/calibrated the camera for the Night Vision system. If the camera for the Night Vision system has already been adjusted/calibrated, it is not necessary to re-position the ACC setting device (VAS 6430).
2 - Position the ACC reflective mirror (VAS 6430/3) on right side in front of the ACC unit -J428-.
3 - Adjust ACC unit -J428-.
4 - Attach ACC reflective mirror (VAS 6430/3) on left side of cross bar in front of ACC control unit 2 -J850-.
5 - Check position of levels and cross bar (refer to bargraph display) and correct as necessary.
6 - Adjust ACC unit -J850-.
Follow the instructions, then press "Continue".
Cancel
Forward
Continue

Required tools.

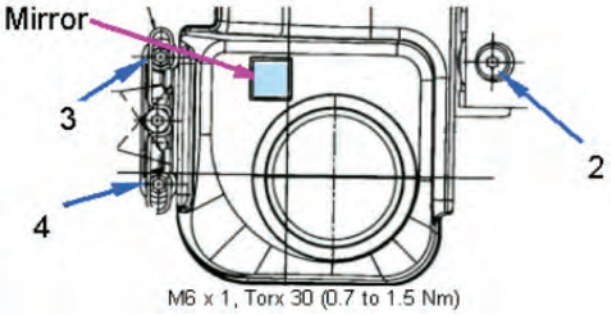
Screen One Battery Maintainer

Press <Continue> after reading all instructions.

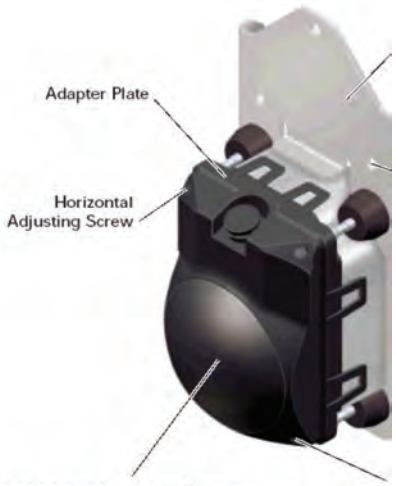

Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
1 - Set up equipment with the ACC reflective mirror (VAS 6430/3) in center position at a distance of 120 cm ± 2.5 cm from Audi rings. Note: This step is necessary if you have not already adjusted/calibrated the camera for the Night Vision system. If the camera for the Night Vision system has already been adjusted/calibrated, it is not necessary to re-position the ACC setting device (VAS 6430).
2 - Position the ACC reflective mirror (VAS 6430/3) on right side in front of the ACC unit -J428-.
3 - Adjust ACC unit -J428-.
4 - Attach ACC reflective mirror (VAS 6430/3) on left side of cross bar in front of ACC control unit 2 -J850-.
5 - Check position of levels and cross bar (refer to bargraph display) and correct as necessary.
6 - Adjust ACC unit -J850-.
Additional current requirements for vehicles in the workshop:
The new Audi battery energy management ensures adequate electrical supply when driving or when parked. For service requirements where the vehicle may be subjected to prolonged testing, an additional electrical supply is required. Connect the approved battery charger VAS 5095 (3) to the battery and switch the battery charger to "support" mode.
Follow the instructions, then press "Continue".
Cancel
Forward
Continue

First Generation ACC

Single radar unit.



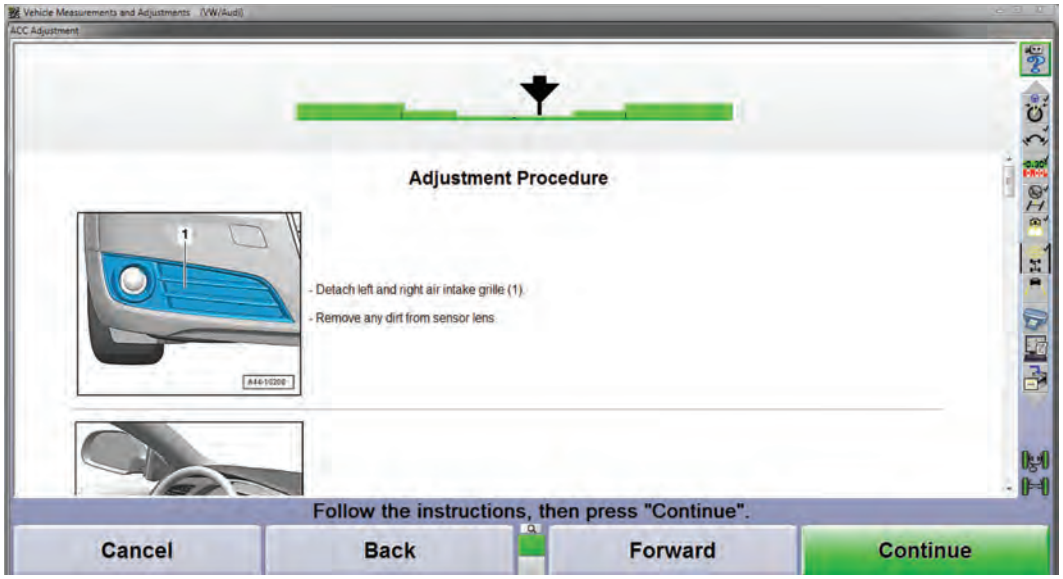
Second Generation ACC


Adapter Plate
Horizontal Adjusting Screw
Right Distance Regulation Sensor G259 and Control Module for Distance Regulation J428

Stage Three: Adaptive Cruise Control

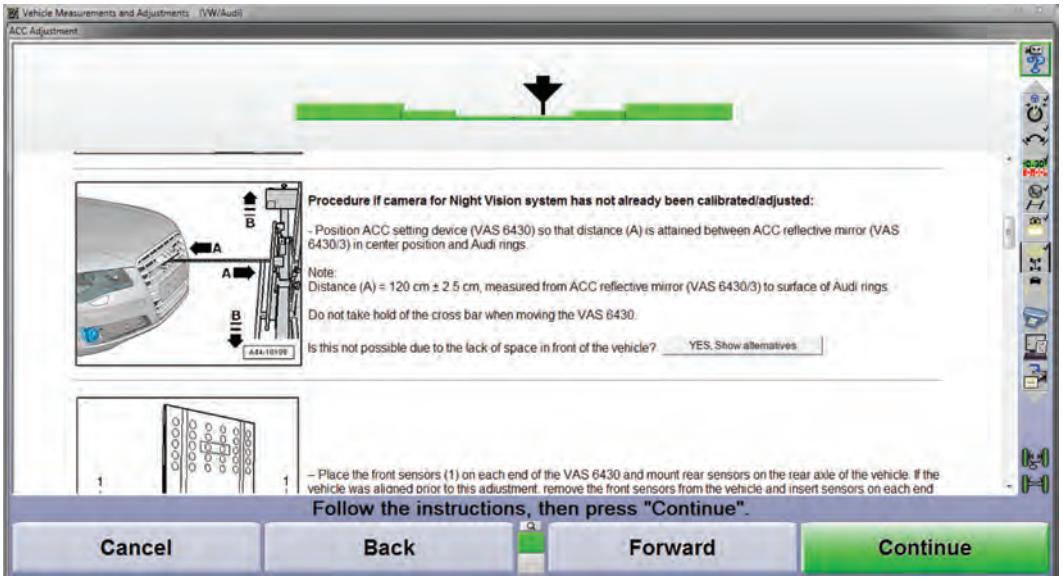
You will notice ONE bar graph on top of calibration screen.

Follow set-up instructions beginning with the removal of both ACC radar module covers and bezels.



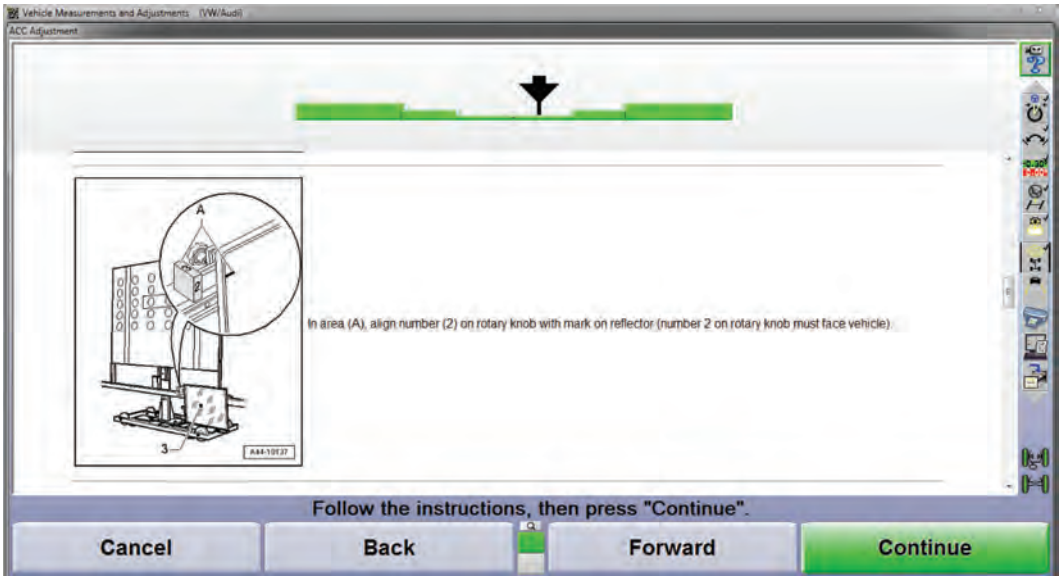
You will notice ONE bar graph on top of calibration screen.

The fixture distance for ACC is the same as Night Vision. Minor adjustments to the VAS 6430 may be needed.


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
Procedure if camera for Night Vision system has not already been calibrated/adjusted:
- Position ACC setting device (VAS 6430) so that distance (A) is attained between ACC reflective mirror (VAS 6430/3) in center position and Audi rings.
Note:
Distance (A) = 120 cm ± 2.5 cm, measured from ACC reflective mirror (VAS 6430/3) to surface of Audi rings.
Do not take hold of the cross bar when moving the VAS 6430.
Is this not possible due to the lack of space in front of the vehicle?
YES, Show alternatives
– Place the front sensors (1) on each end of the VAS 6430 and mount rear sensors on the rear axle of the vehicle. If the vehicle was aligned prior to this adjustment, remove the front sensors from the vehicle and insert sensors on each end
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

You will notice ONE bar graph on top of calibration screen.

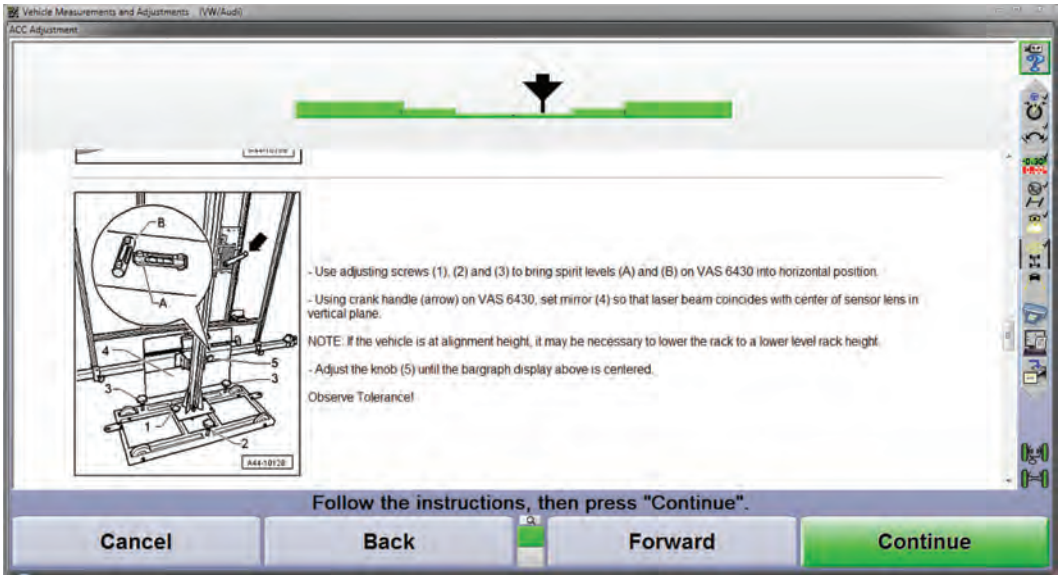
Install reflector on right side and dial it into position 2.


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
In area (A), align number (2) on rotary knob with mark on reflector (number 2 on rotary knob must face vehicle).
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Stage Three: Adaptive Cruise Control

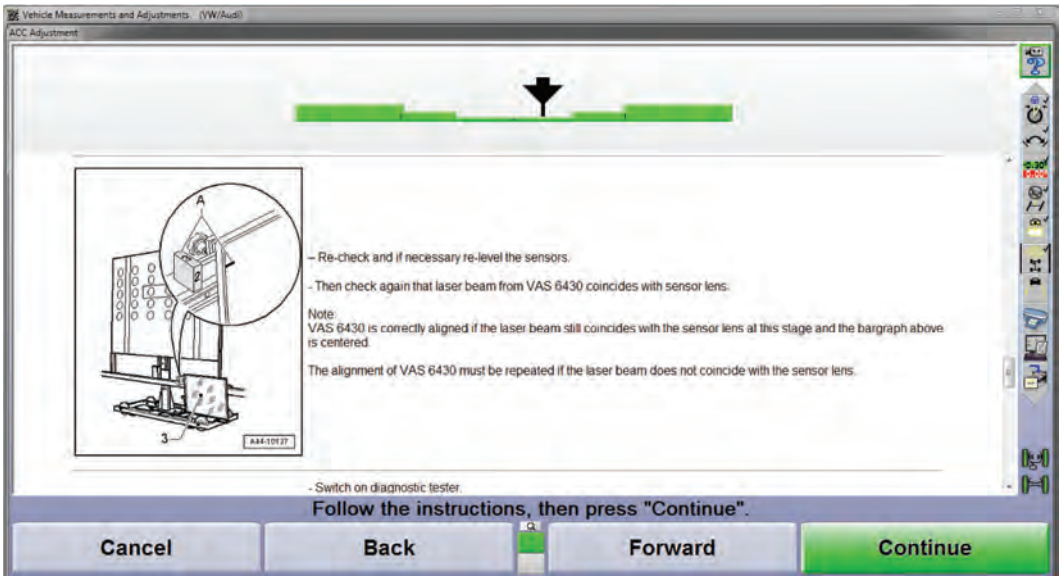
You will notice ONE bar graph on top of calibration screen.

Level reflector as noted in the instructions.


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
- Use adjusting screws (1), (2) and (3) to bring spirit levels (A) and (B) on VAS 6430 into horizontal position.
- Using crank handle (arrow) on VAS 6430, set mirror (4) so that laser beam coincides with center of sensor lens in vertical plane.
NOTE: If the vehicle is at alignment height, it may be necessary to lower the rack to a lower level rack height.
- Adjust the knob (5) until the bargraph display above is centered.
Observe Tolerance!
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

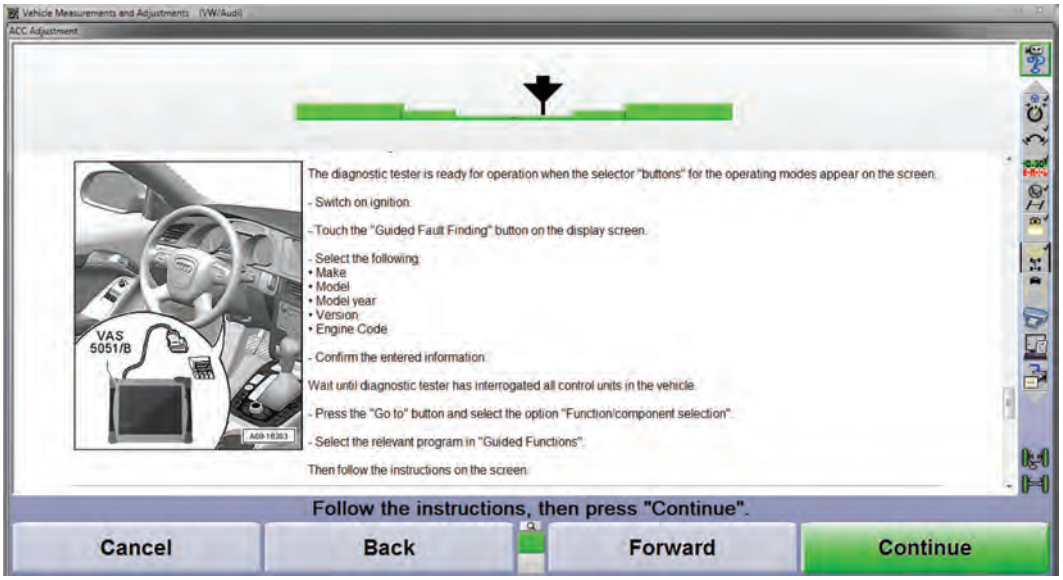
You will notice ONE bar graph on top of calibration screen.

Align so laser returns to center of reflector.


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
– Re-check and if necessary re-level the sensors.
- Then check again that laser beam from VAS 6430 coincides with sensor lens.
Note:
VAS 6430 is correctly aligned if the laser beam still coincides with the sensor lens at this stage and the bargraph above is centered.
The alignment of VAS 6430 must be repeated if the laser beam does not coincide with the sensor lens.
- Switch on diagnostic tester.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

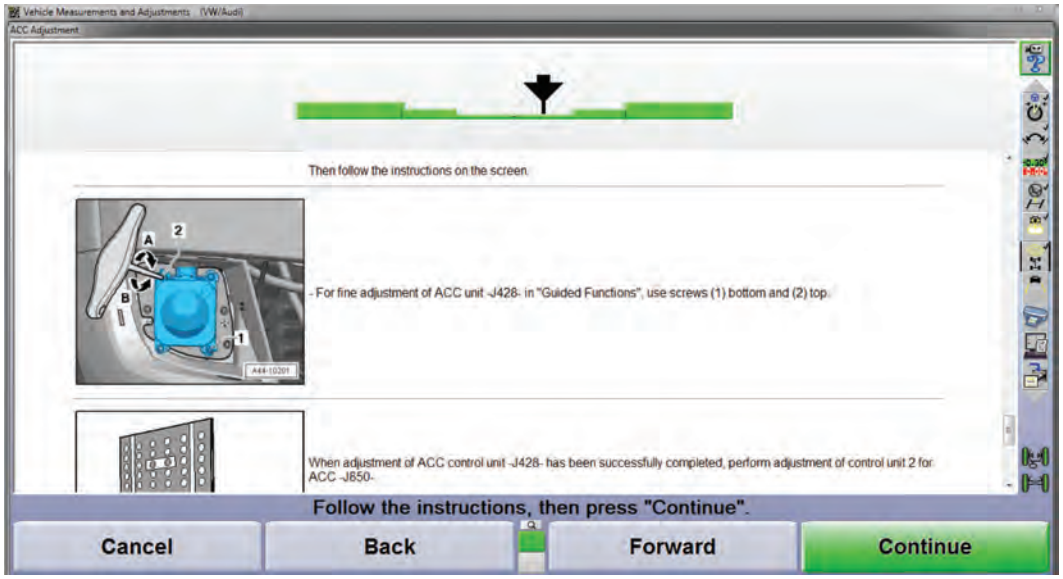
Scan Tool operation now begins.

Address Word 13.

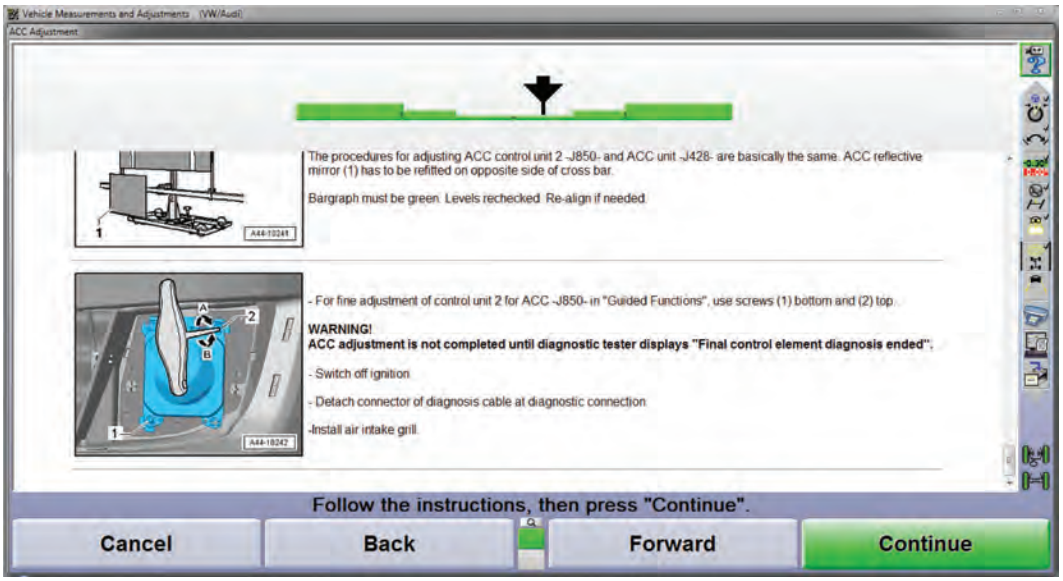

Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
VAS 5051/B
The diagnostic tester is ready for operation when the selector "buttons" for the operating modes appear on the screen.
- Switch on ignition.
- Touch the "Guided Fault Finding" button on the display screen.
- Select the following:
• Make
• Model
• Model year
• Version
• Engine Code
- Confirm the entered information.
Wait until diagnostic tester has interrogated all control units in the vehicle.
- Press the "Go to" button and select the option "Function/component selection".
- Select the relevant program in "Guided Functions".
Then follow the instructions on the screen.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Stage Three: Adaptive Cruise Control

Scan tool will advise adjustment sequence guiding you to the adjuster and how much adjustment to make. Example – adjuster #1 ½ turn to left.


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
Then follow the instructions on the screen.
- For fine adjustment of ACC unit -J428- in "Guided Functions", use screws (1) bottom and (2) top.
When adjustment of ACC control unit -J428- has been successfully completed, perform adjustment of control unit 2 for ACC -J850-
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

After Right side is complete, reposition reflector on left side of VAS 6430, aim the laser at radar as before, level reflector and repeat process before pressing <Continue>.


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
The procedures for adjusting ACC control unit 2 -J850- and ACC unit -J428- are basically the same. ACC reflective mirror (1) has to be refitted on opposite side of cross bar.
Bargraph must be green. Levels rechecked. Re-align if needed.
- For fine adjustment of control unit 2 for ACC -J850- in "Guided Functions", use screws (1) bottom and (2) top.
WARNING!
ACC adjustment is not completed until diagnostic tester displays "Final control element diagnosis ended".
- Switch off ignition.
- Detach connector of diagnosis cable at diagnostic connection.
-Install air intake grill.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

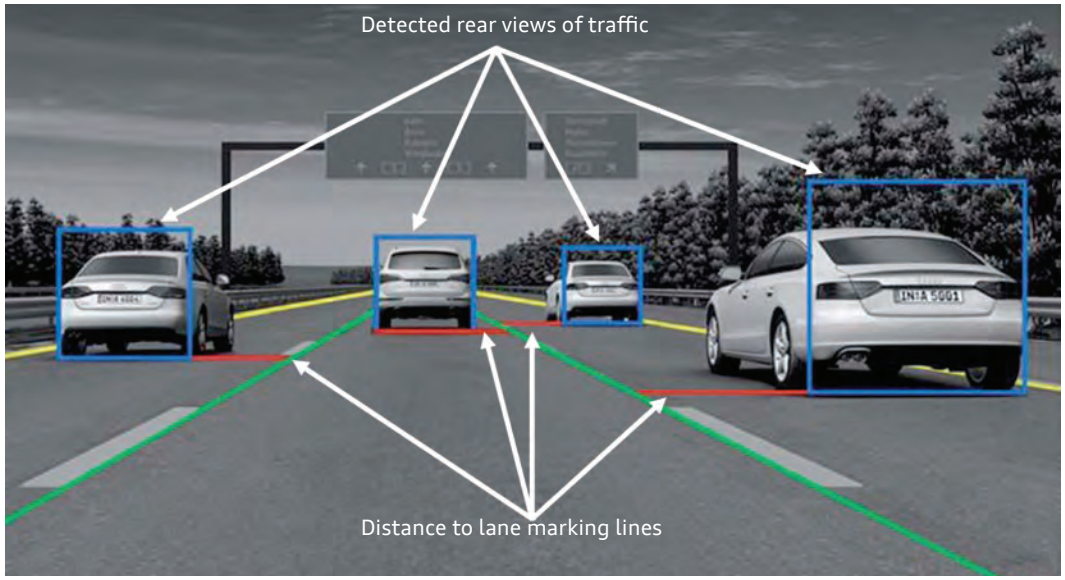
Stop and Go Camera

Radar units measure for distance.

Overhead camera looks for traffic ahead.

Address Word 85.

Uses same calibration process as LDW VAS 6340 and VAS 6340/4.

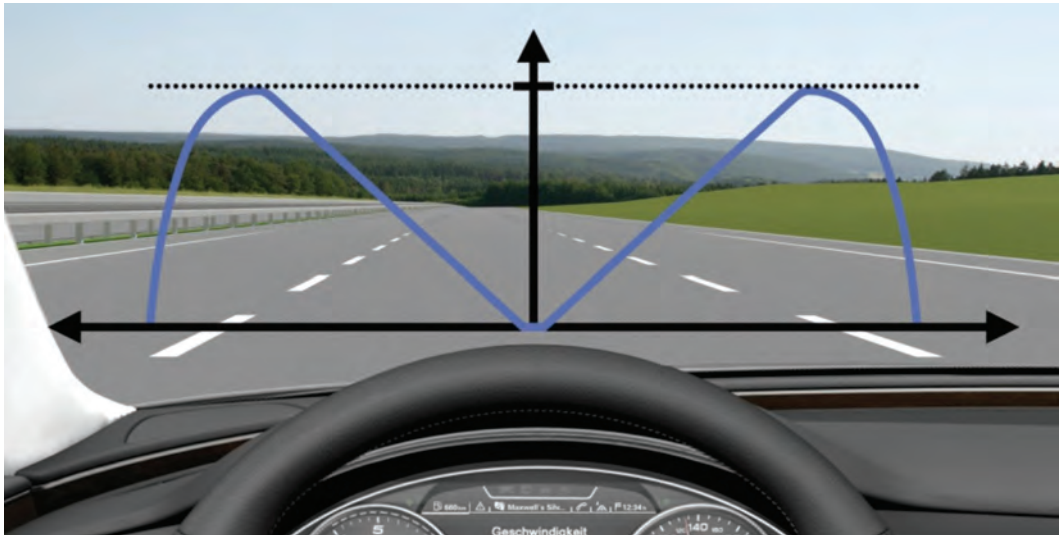


Audi Lane Assist

Lane Departure Warning

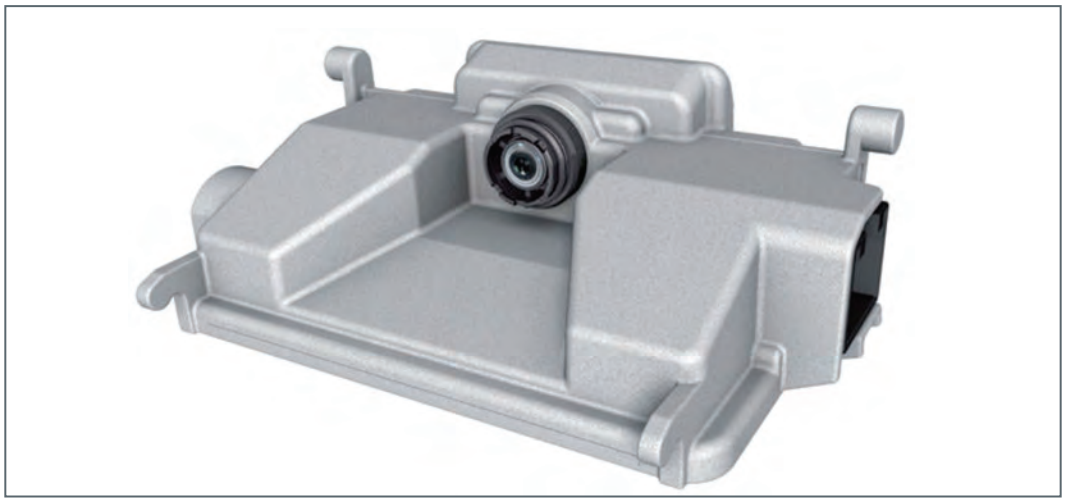
For more information see Self-Study Program 911703, Audi Lane Assist System.

Address Word 5C.

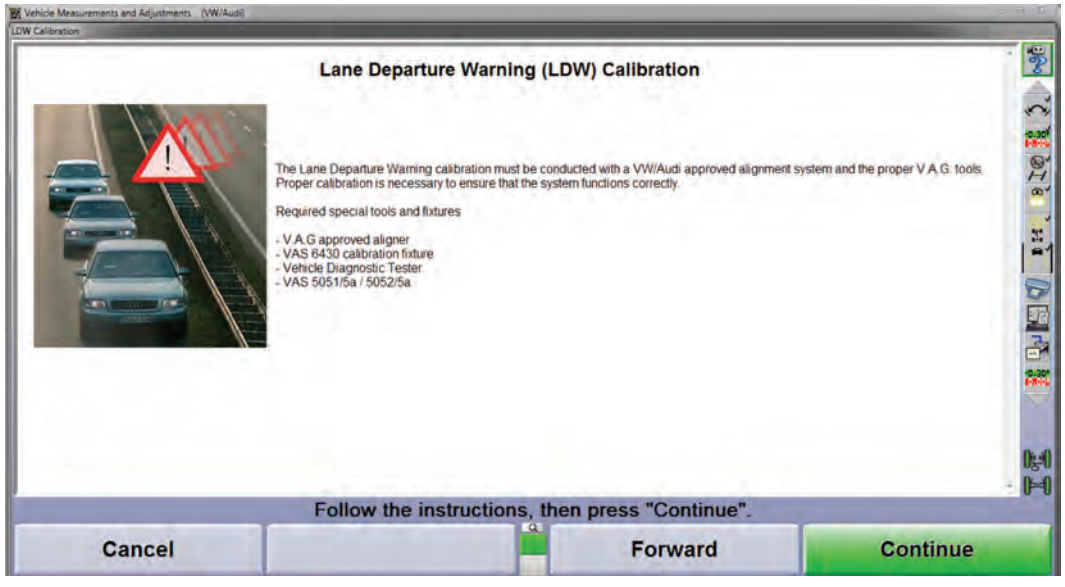


Camera Control Module J852.

Image Processing Control Module J851 for Stop & Go Only.



This screen explains when calibration is necessary and what tools are necessary.

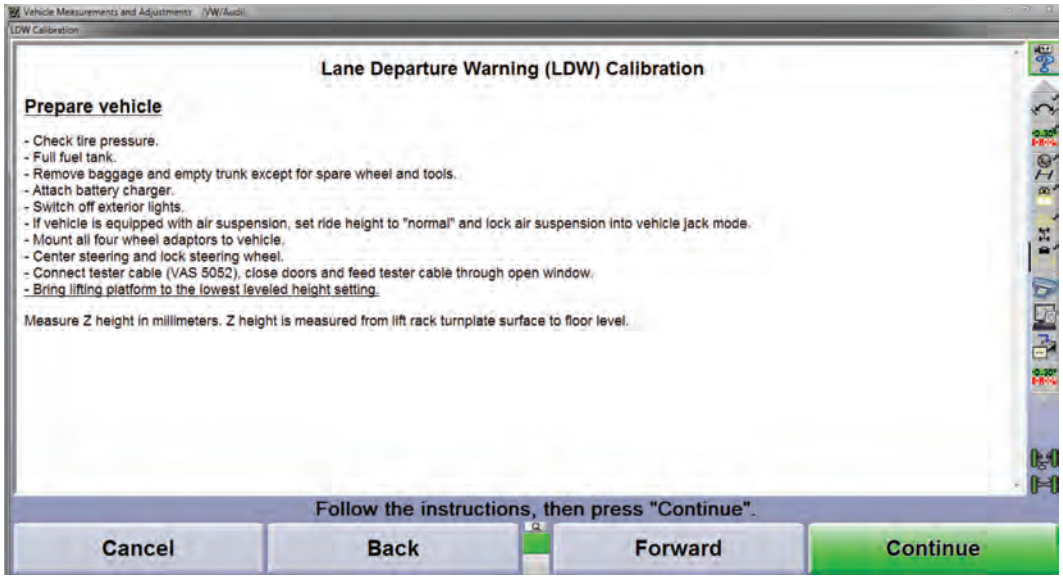

Vehicle Measurements and Adjustments (VW/Audi)
LDW Calibration
Lane Departure Warning (LDW) Calibration
The Lane Departure Warning calibration must be conducted with a VW/Audi approved alignment system and the proper V.A.G. tools. Proper calibration is necessary to ensure that the system functions correctly.
Required special tools and fixtures
- V.A.G approved aligner
- VAS 6430 calibration fixture
- Vehicle Diagnostic Tester
- VAS 5051/5a / 5052/5a
Follow the instructions, then press "Continue".
Cancel
Forward
Continue

Stage Three: Audi Lane Assist

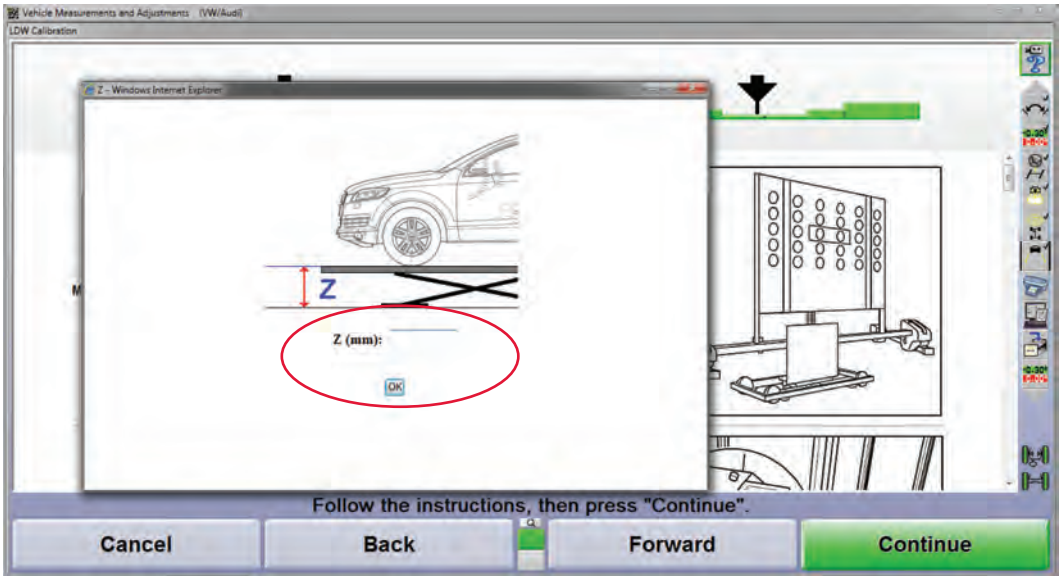
This screen explains prep work.

Note mention of Z height.

Press <Continue>.

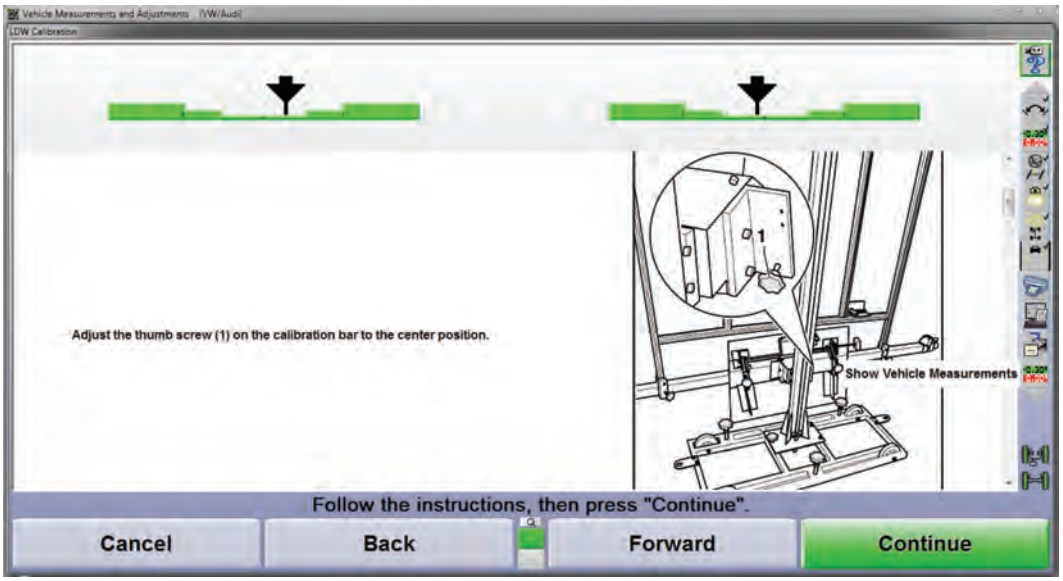

Lane Departure Warning (LDW) Calibration
Prepare vehicle
- Check tire pressure.
- Full fuel tank.
- Remove baggage and empty trunk except for spare wheel and tools.
- Attach battery charger.
- Switch off exterior lights.
- If vehicle is equipped with air suspension, set ride height to "normal" and lock air suspension into vehicle jack mode.
- Mount all four wheel adaptors to vehicle.
- Center steering and lock steering wheel.
- Connect tester cable (VAS 5052), close doors and feed tester cable through open window.
- Bring lifting platform to the lowest leveled height setting.
Measure Z height in millimeters. Z height is measured from lift rack turnplate surface to floor level.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Enter Z Height here and click <OK>.



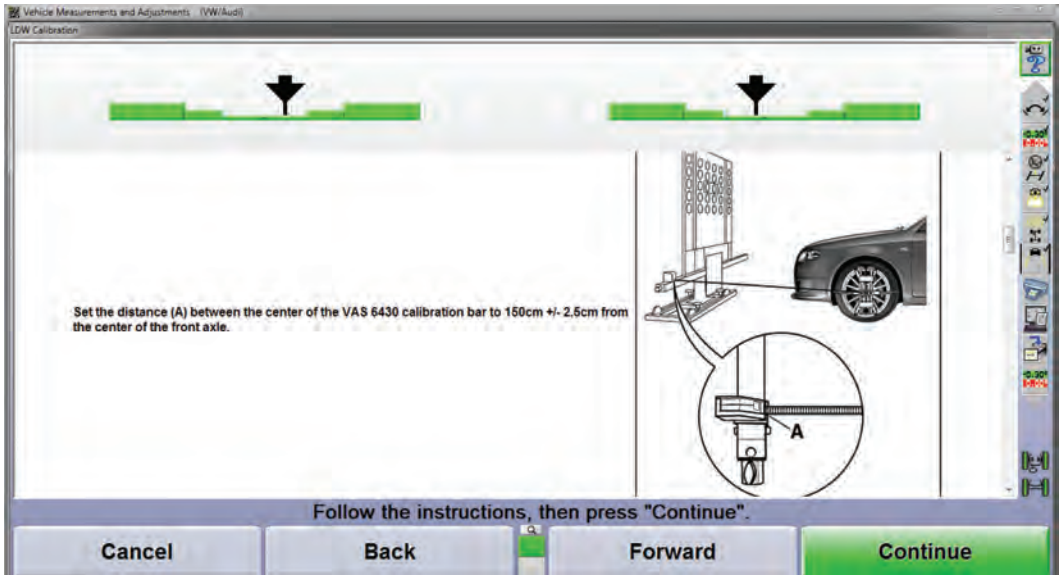
This screen describes the adjustment fixture and set-up.

Scroll down for more information.

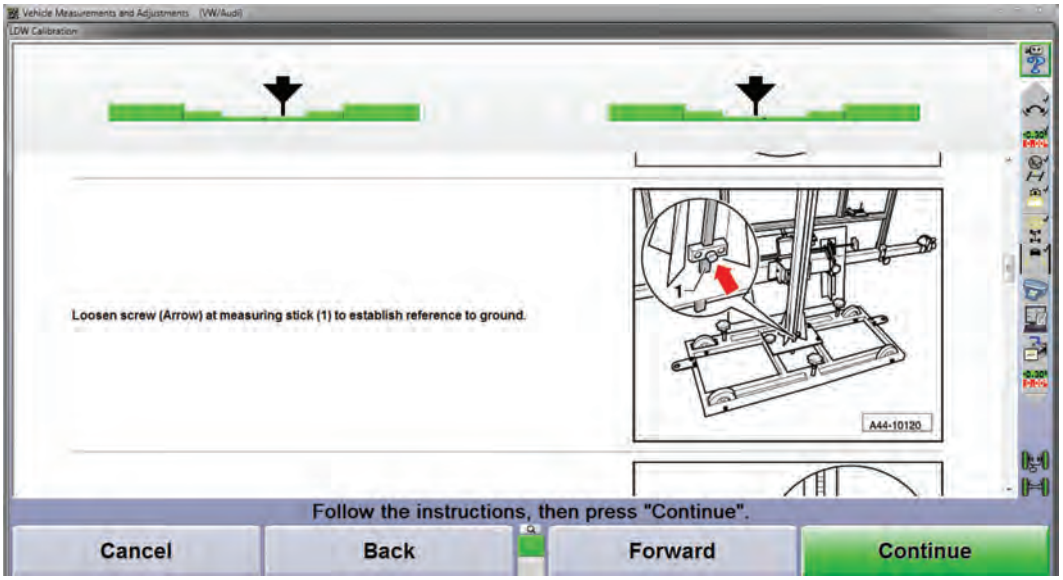


Adjust distance as instructed. 150 cm from wheel center.

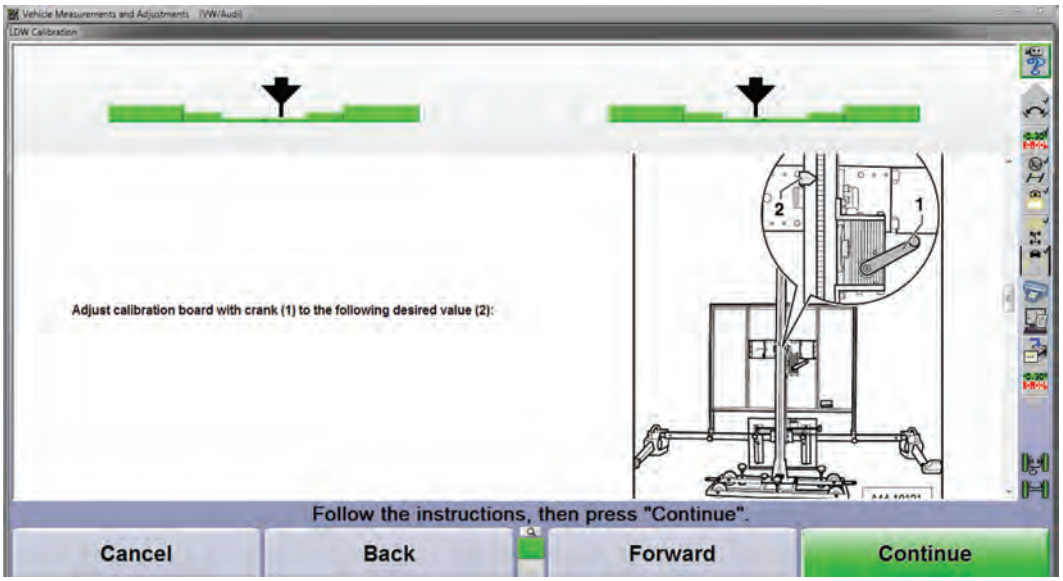
Scroll down after distance is achieved.


Vehicle Measurements and Adjustments (VW/Audi)
LDW Calibration
Set the distance (A) between the center of the VAS 6430 calibration bar to 150cm +/- 2.5cm from the center of the front axle.
A
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Lower scale on back of fixture as shown.

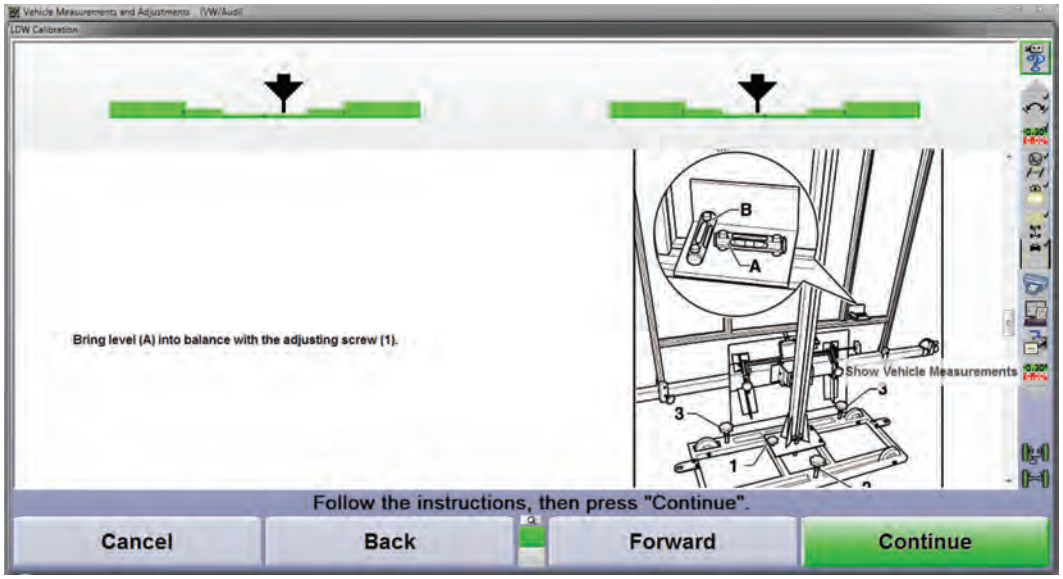


Set height with crank to match value o screen.

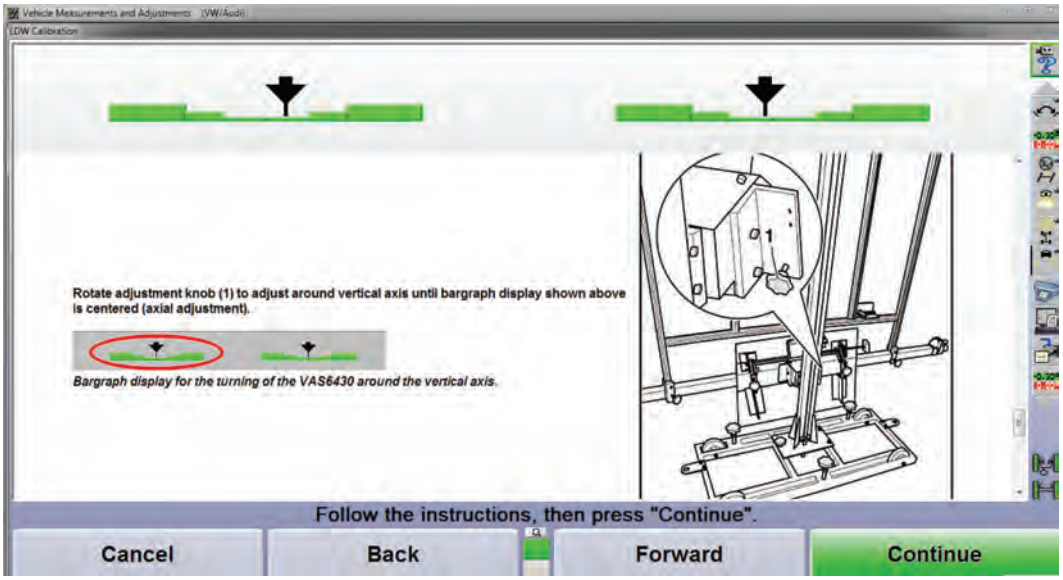


Stage Three: Audi Lane Assist

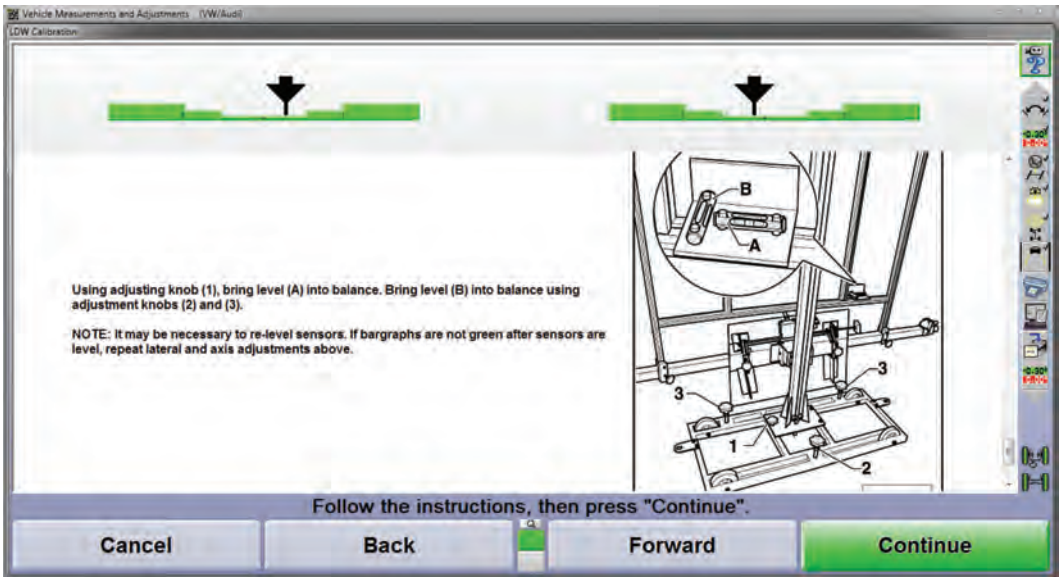
Level fixture with level on back side of 6340/5.



Make fine adjustment to thrust.

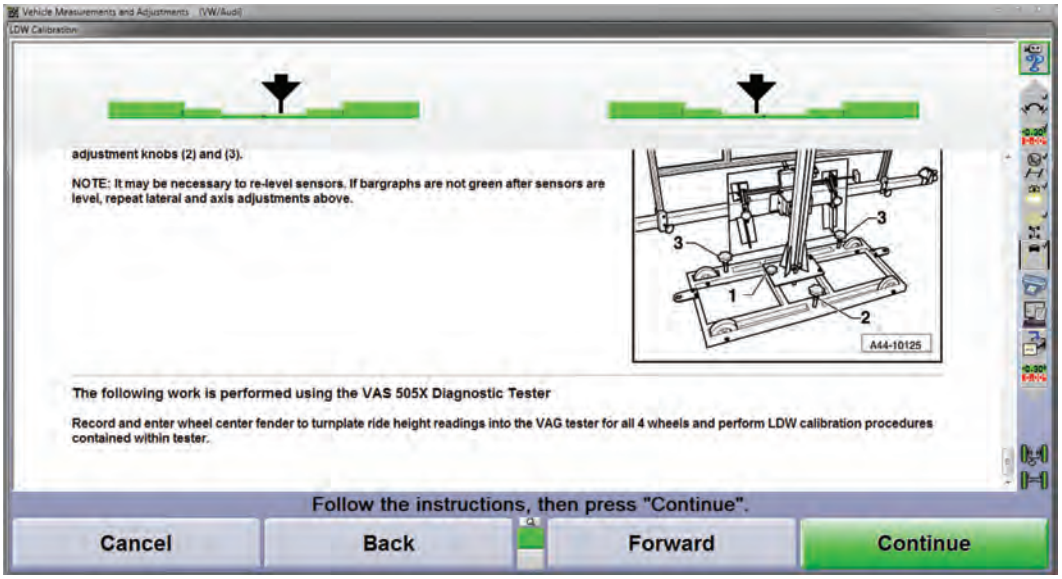

Vehicle Measurements and Adjustments (VW/Audi)
LDW Calibration
Rotate adjustment knob (1) to adjust around vertical axis until bargraph display shown above is centered (axial adjustment).
Bargraph display for the turning of the VAS6430 around the vertical axis.
1
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Make fine adjustments again with knobs as shown.


Vehicle Measurements and Adjustments (VW/Audi)
LDW Calibration
Using adjusting knob (1), bring level (A) into balance. Bring level (B) into balance using adjustment knobs (2) and (3).
NOTE: It may be necessary to re-level sensors. If bargraphs are not green after sensors are level, repeat lateral and axis adjustments above.
B
A
3
3
1
2
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Make fine adjustments to thrust and begin calibration with Scan Tool.

Press <Continue> after calibration is complete.


adjustment knobs (2) and (3).
NOTE: It may be necessary to re-level sensors. If bargraphs are not green after sensors are level, repeat lateral and axis adjustments above.
3
3
1
2
A44-10125
The following work is performed using the VAS 505X Diagnostic Tester
Record and enter wheel center fender to turnplate ride height readings into the VAG tester for all 4 wheels and perform LDW calibration procedures contained within tester.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Print out will include the completed calibrations on bottom.

Be sure to save alignment for future reference!

Front	Left		Right
Camber	-1°05'		-1°06'
Cross Camber		0°02'	
Caster	0°00'		0°00'
Cross Caster		0°00'	
SAI	0°00'		0°00'
Cross SAI		0°00'	
Toe	0°06'		0°06'
Total Toe		0°13'	
Rear	**Left**		**Right**
Camber	-1°27'		-1°28'
Cross Camber		0°01'	
Toe	0°11'		0°09'

Audi Side Assist

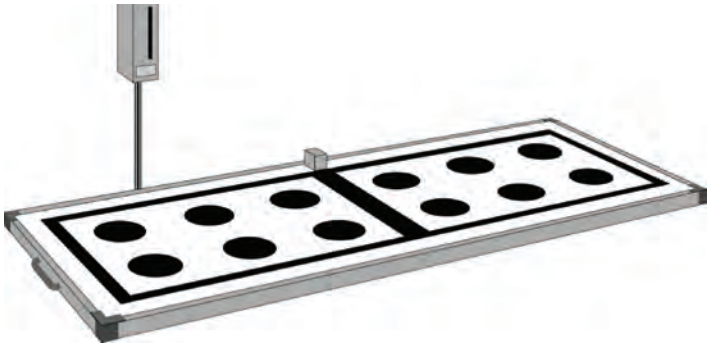
For more information see Self-Study Program 996603, Audi Q7 Driver Assistance Systems.

Address Word 3C.

Has manual On/Off switch.

Tool required calibration is the VAS 6350/1 fixture.

Board with VAS 6350 and VAS 6350/2 Bar Laser.

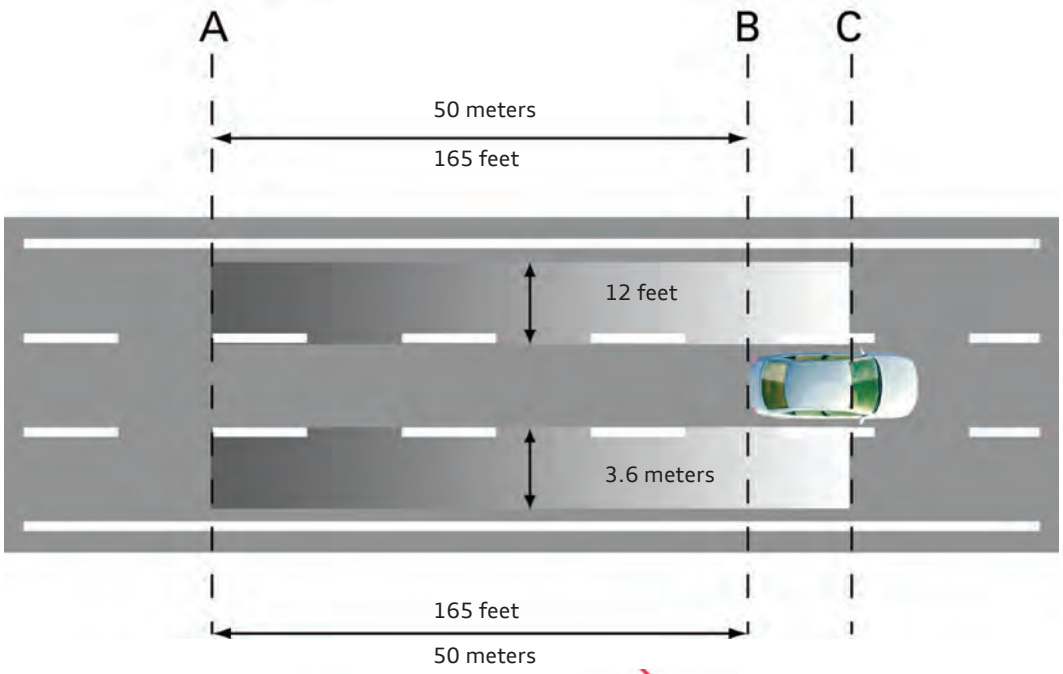


Two control modules are located behind bumper cover that require calibration.

Lane Change Assistance Control Module 2 J770 (Slave)

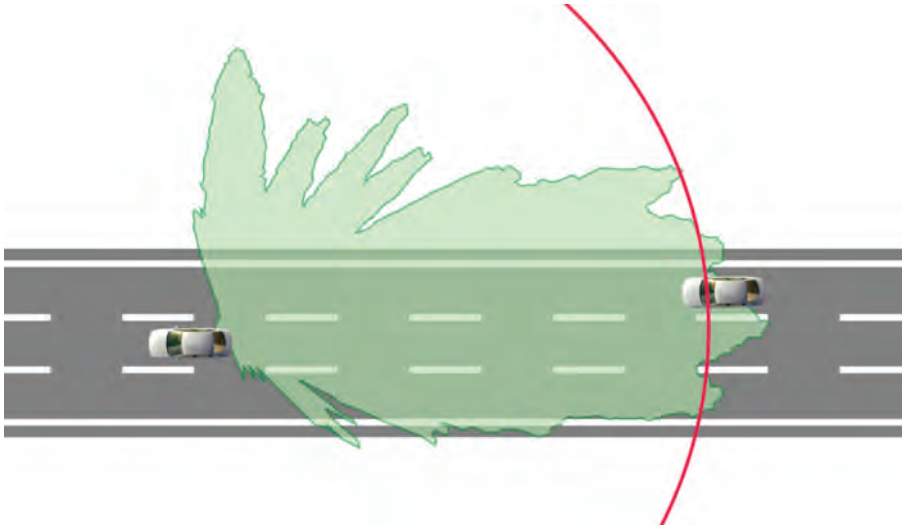
Lane Change Assistance Control Module J769 (Master)

- Modules used to monitor surrounding traffic.



- Audi side assist must be calibrated after major wheel alignment, collision damage, or removal of components.

  Misalignment can affect distance and side angle calculations and give false signals to driver.



- Fixture must be placed 150cm from wheel center marker.

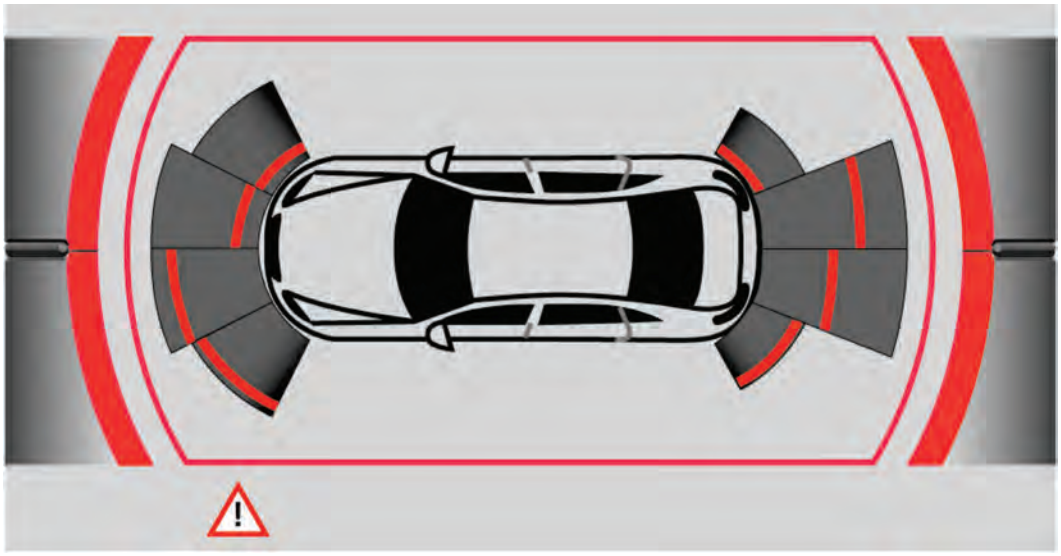
  Note paddles on rear wheels – correct rear thrust is critical!

Optical Parking System

For more information see Self-Study Program 996603, Audi Q7 Driver Assistance Systems.

Address Word 76.

Has manual On/Off switch. Automatic engagement in reverse.



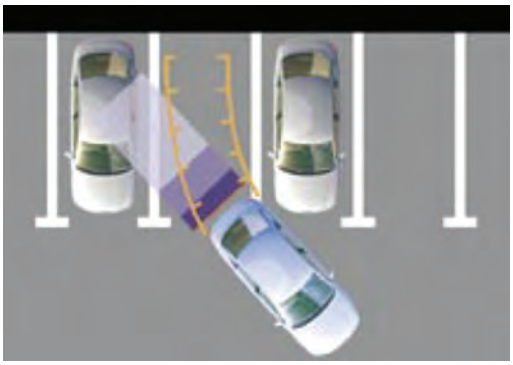
Rear View Camera

For more information see Self-Study Program 996603, Audi Q7 Driver Assistance Systems.

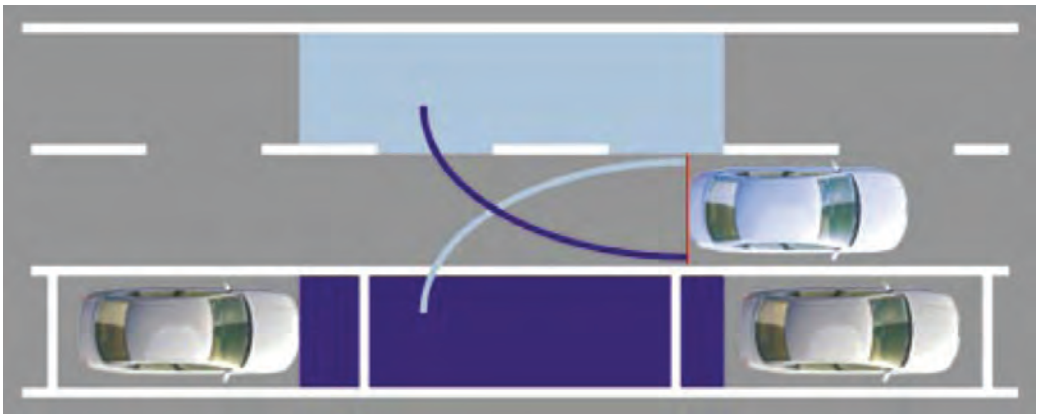
Address Word 6C.

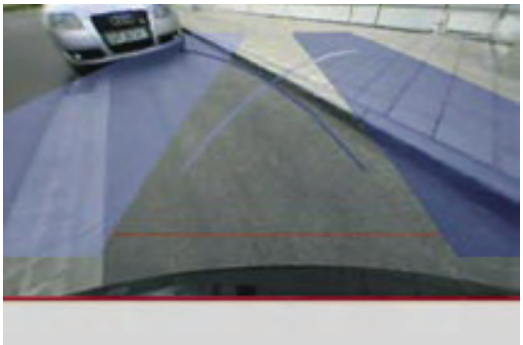
Uses Steering Angle Sensor G85 for guidance.

Relies on thrust and steer ahead for guidance.



View of park assist.

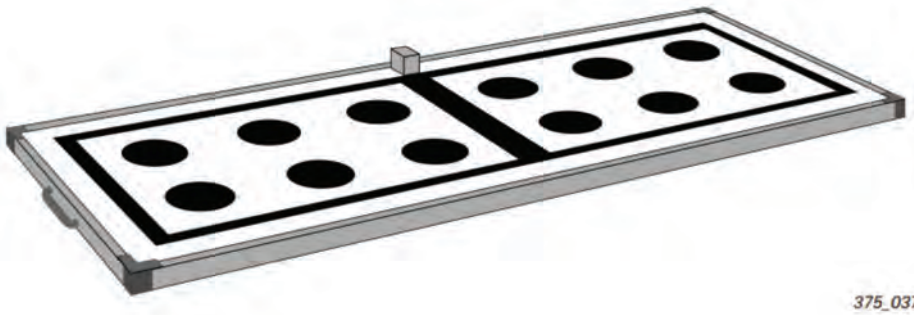




Stage Three: Rear View Camera

Tools - 6350/1 Calibration Board & 6350/2 Laser.

Set up and center board as in Audi side assist without VAS 6350 Doppler generator and proceed as instructed by Scan Tool.

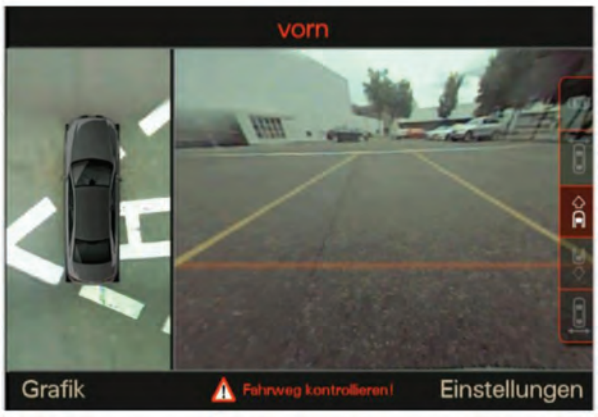


Top View Camera

Set up VAS 6350/1 fixture as per Rear view camera guidelines.

New fixture VAS 6350 will be installed and used for this procedure.

Parking view on MMI.



Stage Three: Top View Camera

Bird’s eye view on MMI.

Enhanced grid for trailer coupling.

Course Review

Stage one

- Pre-Alignment Procedures

Stage two

- Alignment

Stage three

- Post Alignment
  - Dynamic Steering Calibration
  - Night Vision Assist
  - Adaptive Cruise Control
  - Audi Lane Assist
  - Audi Side Assist
  - Optical Parking System
  - Rear View Camera
  - Top View Camera

What Must be Completed to Receive Credit?

- The on-line Knowledge Assessment
  - Found in the Audi CRC: **960322B**

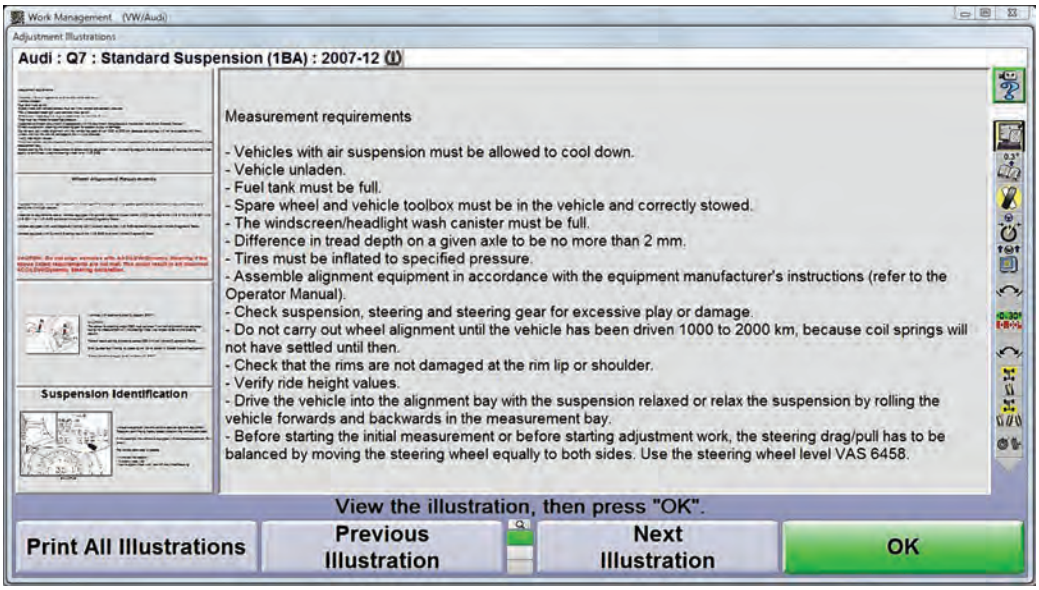
The Hands-On Evaluation

In addition to the normal on-line assessment, you will be asked to individually demonstrate your ability to perform various ODIS Service functions during this class. This can happen at any time, so be prepared when asked by your instructor.

Pre-Alignment Concerns

Vehicle Specific Pre-Alignment Instructions

Hunter's WinAlign® alignment program will display a pre-alignment checklist after the Audi vehicle is selected from the vehicle specific specification database. Following the "Measurement Requirements" for the vehicle selected is of vital importance.


Work Management (VW/Audi)
Adjustment Illustrations
Audi : Q7 : Standard Suspension (1BA) : 2007-12
Measurement requirements
- Vehicles with air suspension must be allowed to cool down.
- Vehicle unladen.
- Fuel tank must be full.
- Spare wheel and vehicle toolbox must be in the vehicle and correctly stowed.
- The windscreen/headlight wash canister must be full.
- Difference in tread depth on a given axle to be no more than 2 mm.
- Tires must be inflated to specified pressure.
- Assemble alignment equipment in accordance with the equipment manufacturer's instructions (refer to the Operator Manual).
- Check suspension, steering and steering gear for excessive play or damage.
- Do not carry out wheel alignment until the vehicle has been driven 1000 to 2000 km, because coil springs will not have settled until then.
- Check that the rims are not damaged at the rim lip or shoulder.
- Verify ride height values.
- Drive the vehicle into the alignment bay with the suspension relaxed or relax the suspension by rolling the vehicle forwards and backwards in the measurement bay.
- Before starting the initial measurement or before starting adjustment work, the steering drag/pull has to be balanced by moving the steering wheel equally to both sides. Use the steering wheel level VAS 6458.
Suspension Identification
View the illustration, then press "OK".
Print All Illustrations
Previous Illustration
Next Illustration
OK

The following comments will serve to explain the importance of each requirement.

Vehicles with air suspensions must be allowed to cool down.
- Air ride suspensions will change ride height as the air cools in the bags.
- Ride height directly affects wheel alignment angles.

Vehicle unladen
- Weight added or removed from the vehicle directly affects vehicle ride height, which also affects alignment angles.

Fuel tank must be full.
- Gas weighs approximately 6 pounds per gallon.
- Weight added or removed from the vehicle directly affects vehicle ride height, which also affects alignment angles.

Spare tire and tool box present and properly stored.
- Weight affects vehicle ride height
- Ride height affects wheel alignment angles.

Windscreen/headlight wash canister must be full.
- Weight affects vehicle ride height
- Ride height affects wheel alignment angles.

Difference in tread depth on a given axle may be no more than 2mm.
- Tread depth affects rolling resistance.
- Rolling resistance affects pulls, drifts, steering wheel returnability, ride quality, braking and handling performance.

Tires must be inflated to specified pressure.
- Tire inflation affects rolling resistance.
- Rolling resistance affects pulls, drifts, steering wheel returnability, ride quality, braking and handling performance.

Assemble alignment equipment correctly.

- The wheel sensor / adapter assembly must be assembled and mounted to the wheel correctly for measurements to be accurate.
- Common mistakes include:
  - Sensor shaft not inserted in adapter receiver correctly
  - Adapter center casting not centered
  - Mounting method of adapter to wheel not consistent side-to-side

Check suspension, steering and steering gear for excessive play or damage.

- Worn or damaged suspension and/or steering components affect all alignment angles.
- Toe angles are most affected, which directly influence tire wear, handling and steering wheel position.

Do not carry out wheel alignment until vehicle has been driven 1000 to 2000 km.

- Coil springs will change ride height for the first 1000 to 2000 km.
- Ride height directly affects alignment angles.

Check rims for damage at the rim lip or shoulder.

- Damage at the rim lip or shoulder affects tire/wheel balance and runout.
- Both of these conditions may contribute to vibration problems and may affect the ability of the alignment system to compensate sensors.

Verify ride height values.

- Ride height directly affects wheel alignment angles.
- Camber and toe angles are very sensitive to changes in vehicle ride height.

Drive the vehicle into the alignment bay with the suspension relaxed or relax the suspension.

- Hard stops, starts and turns load the suspension.
- Any binding of the suspension will affect the alignment angles.
- Rolling the vehicle back and forth will relax the suspension.

Before starting the initial measurements or before starting adjustment work, the steering drag/pull has to be balanced by moving the steering wheel equally to both sides. Use the steering wheel level VAS 6458.

- An unbalanced steering system may cause the front wheels to steer causing alignment angles to change.
- The VAS 6458 steering wheel level will insure proper steering wheel position when adjusting front toe

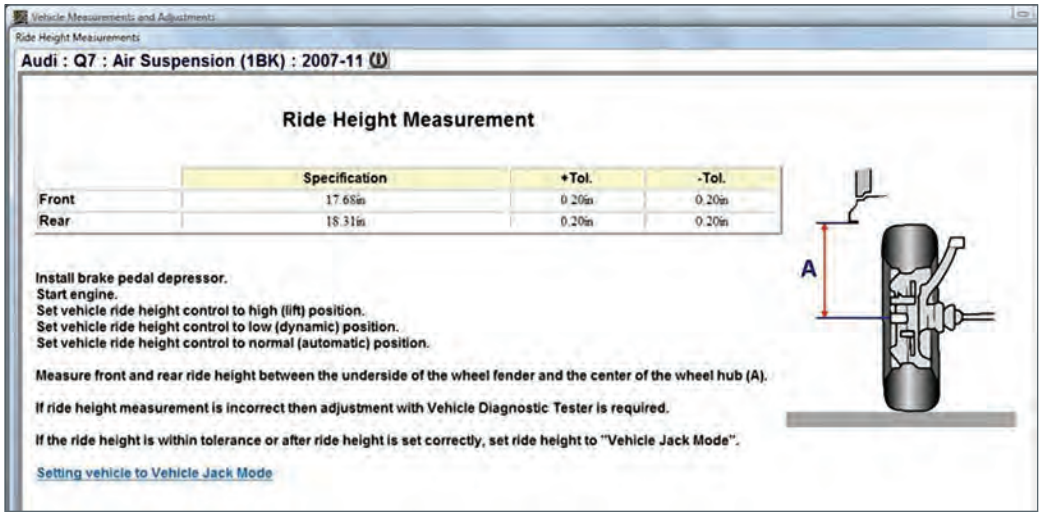
Appendix A

Ride Height

Vehicles with Air Ride Suspensions

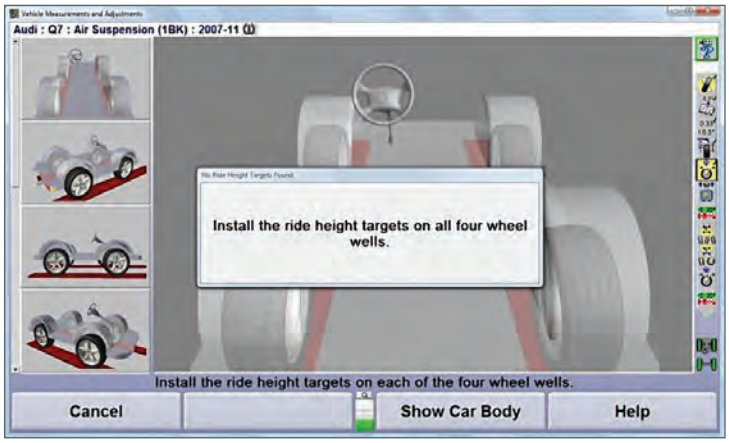
The air suspension functions as a high-tech self-leveling suspension – it keeps the body at the ideal height, regardless of the load situation.

Proper ride height is critical to the wheel alignment process. Vehicles equipped with an air ride suspension must be tested for proper ride height and re-calibrated when needed.

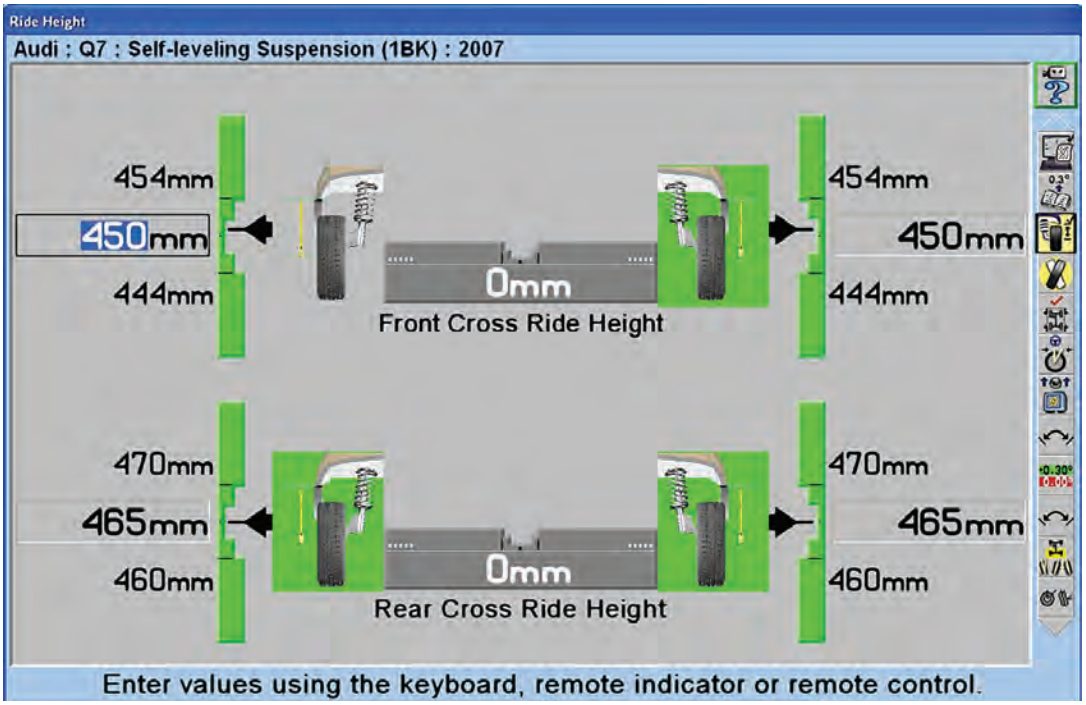

Vehicle Measurements and Adjustments
Ride Height Measurements
Audi : Q7 : Air Suspension (1BK) : 2007-11
Ride Height Measurement
Specification
+Tol.
-Tol.
Front
17.68in
0.20in
0.20in
Rear
18.31in
0.20in
0.20in
A
Install brake pedal depressor.
Start engine.
Set vehicle ride height control to high (lift) position.
Set vehicle ride height control to low (dynamic) position.
Set vehicle ride height control to normal (automatic) position.
Measure front and rear ride height between the underside of the wheel fender and the center of the wheel hub (A).
If ride height measurement is incorrect then adjustment with Vehicle Diagnostic Tester is required.
If the ride height is within tolerance or after ride height is set correctly, set ride height to "Vehicle Jack Mode".
Setting vehicle to Vehicle Jack Mode

Vehicle's equipped with Adaptive Air suspension will require a pre-alignment procedure using the VAS 5051 or 5052. The ride height is exercised and checked.

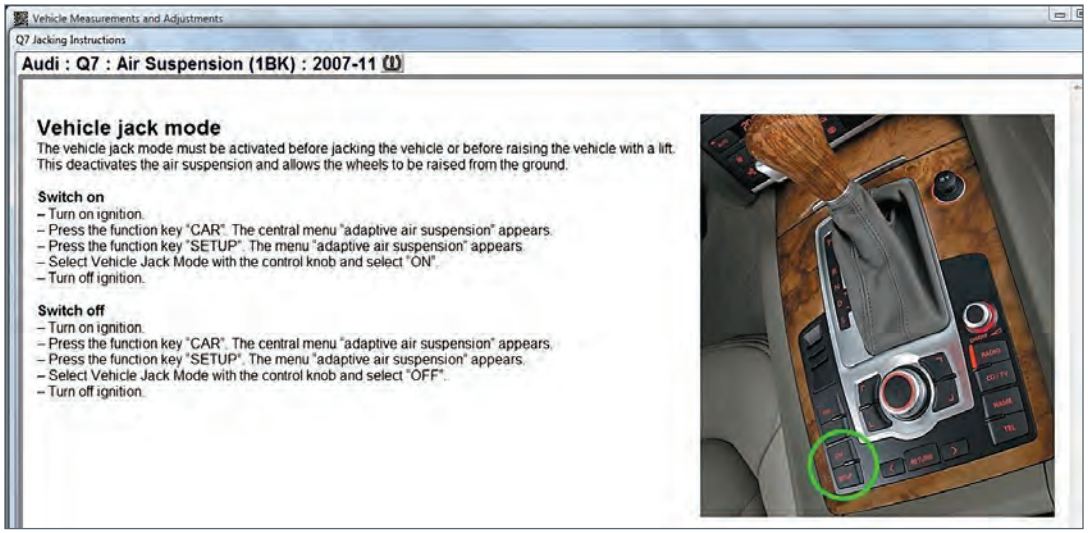
- Install brake pedal depressor
- Start engine
- Set vehicle ride height control to high (Lift) position
- Set vehicle ride height control to low (dynamic) position
- Set vehicle ride height control to normal (automatic) position
- Measure front and rear ride height between the underside of the wheel fender and the center of the wheel hub
- If ride height measurement is incorrect, adjustment with Vehicle Diagnostic Tester is required
- If ride height measurement is within tolerances, or after ride height is set correctly, set the ride height control to "Vehicle Jack Mode".


Audi : Q7 : Air Suspension (1BK) : 2007-11
Install the ride height targets on all four wheel wells.
Install the ride height targets on each of the four wheel wells.
Cancel
Show Car Body
Help

Live Ride Height Screen and Targets



Standard Ride Height Screen

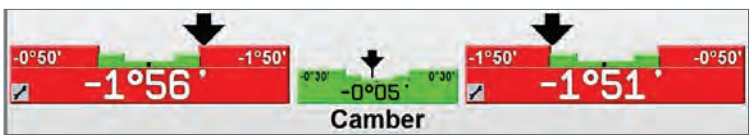

Vehicle Measurements and Adjustments
Q7 Jacking Instructions
Audi : Q7 : Air Suspension (1BK) : 2007-11
Vehicle jack mode
The vehicle jack mode must be activated before jacking the vehicle or before raising the vehicle with a lift. This deactivates the air suspension and allows the wheels to be raised from the ground.
Switch on
– Turn on ignition.
– Press the function key "CAR". The central menu "adaptive air suspension" appears.
– Press the function key "SETUP". The menu "adaptive air suspension" appears.
– Select Vehicle Jack Mode with the control knob and select "ON".
– Turn off ignition.
Switch off
– Turn on ignition.
– Press the function key "CAR". The central menu "adaptive air suspension" appears.
– Press the function key "SETUP". The menu "adaptive air suspension" appears.
– Select Vehicle Jack Mode with the control knob and select "OFF".
– Turn off ignition.

Steel Spring

Vehicles with steel springs are no exception to the rule regarding ride height. Measure the ride height as indicated in the appropriate service manual.

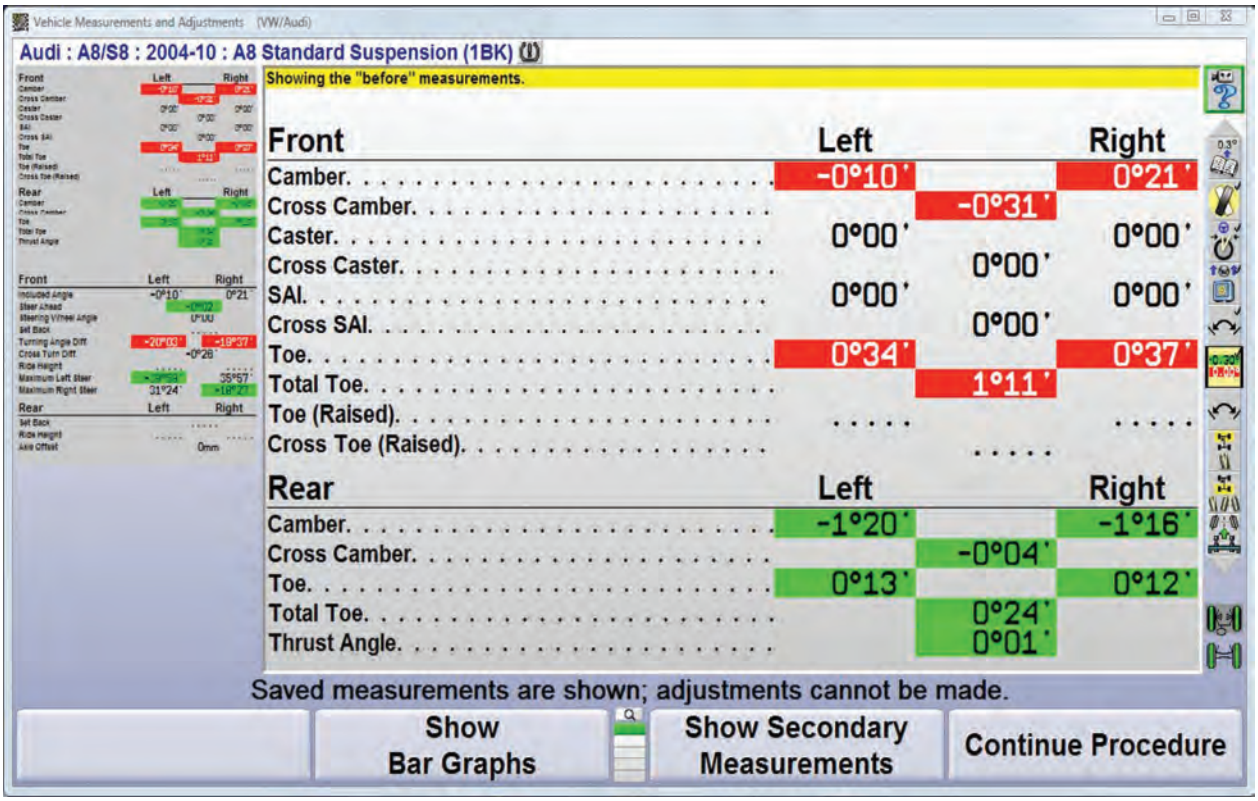
Camber angles are good indicators of ride height problems. As vehicle ride height lowers, camber tilts inward.

Excessive negative camber, which is fairly even side-to-side, is an excellent indicator the springs have sagged.



Alignment Angle Overview

Primary Measurement Screen



Explanation:

- Camber for the left and right front wheels is expressed in degrees and minutes
  - 60 minutes = one degree
  - Positive or negative numbers designate tilt of wheel at the top
- Cross camber is the difference between left and right front camber
- Caster for the left and right front wheels is expressed in degrees and minutes
  - 60 minutes = one degree
  - Positive or negative numbers designate tilt of steering axis forward or rearward
- Cross caster is the difference between left and right front caster
- S.A.I. is a diagnostic angle used to find bent parts effecting front camber
  - Control arm links, Strut tower, Sub-frame
- Toe for the left and right front wheels is expressed in degrees and minutes
  - 60 minutes = one degree
  - Positive or negative numbers designate steer position of wheel

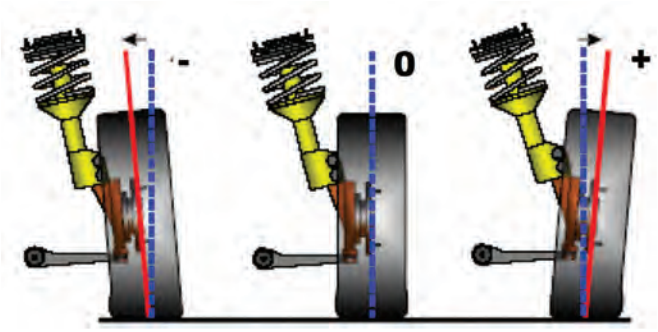
Camber

Definition:

Camber is the angle formed by the inward or outward tilt of the wheel compared to a vertical line starting from the center base of the tire.

Camber is measured in degrees and displayed in degrees and minutes.

60 minutes = 1 degree.



Positive camber – an outward tilt of the wheel at the top.
Negative camber – an inward tilt of the wheel at the top.

Camber is a direct tire wear angle. Excessive camber may cause premature tire wear.

Excessive positive camber

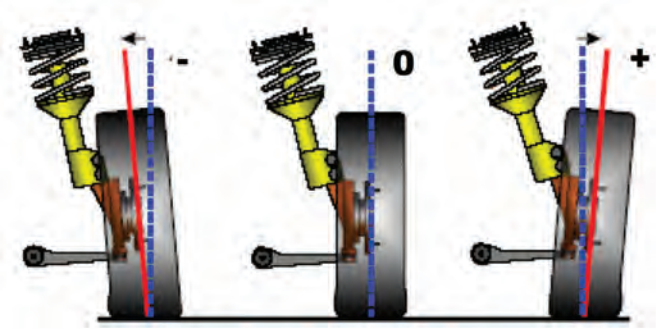
- Tilted to far outward at top
- Increases scuffing on the outside of the tread surface

Excessive negative camber

- Tilted to far inward at top
- Increases scuffing on the inside of the tread surface

Rear camber will exhibit the same tire wear patterns as front camber if excessive.

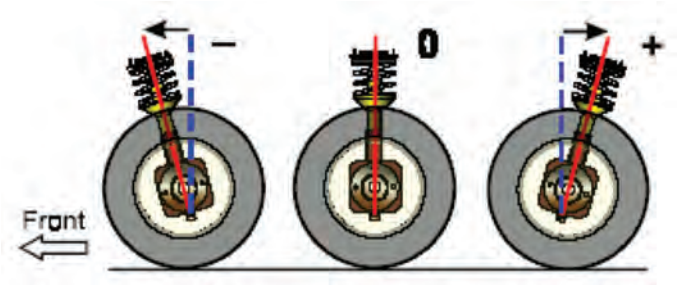
Positive camber enhances ride quality.
Negative camber enhances cornering performance.



Cross camber greater than 0°30’ may cause a pull or drift to the side with the most positive camber setting.

Caster

Definition:



Caster is the angle formed by the forward or rearward tilt of the steering axis in reference to a vertical line drawn from the center base of the wheel and viewed from the side.

Positive caster
- the rearward tilt of the steering axis at the top

Negative caster
- the forward tilt of the steering axis at the top

Caster is measured in degrees and displayed in degrees and minutes. 60’ = 1.00°

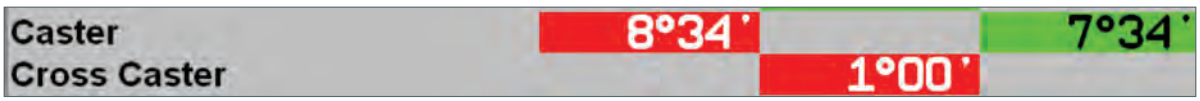
Caster is not a direct tire wear angle.

Caster has an indirect influence on tire wear when the front wheels steer away from straight ahead because it causes front camber angles to change.

Camber Roll - the change in front camber when front wheels are steered

The outer edges of the front tires may exhibit wear, if the vehicle is cornered aggressively.

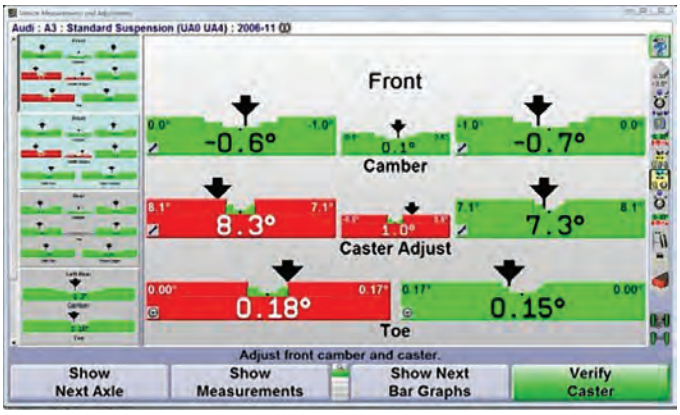
Cross caster - the difference in the left and right front caster measurements.



Cross caster greater than 30’ (1/2°) may cause a pull or drift to the side with the least positive caster setting.

Front caster angles must be measured by steering the front wheels to the left and right of center a specified amount.

The following displays may be used to watch caster adjustments:
- Virtual ViewTM
- Front bar graphs
- Zero Adjust
- CAMM®



The primary measurement display cannot be used to watch caster adjustments.

Toe

Total toe is the difference in distance between the front of the tires and rear of the tires on the same axle.

Incorrect total toe drastically effects tire life

Excessive toe will cause shoulder wear on the tire's tread. Unlike camber, the wear pattern will feather toward the center of the tire as the condition continues.

Notice how the wear begins on the shoulder and continues to move across the tread of the tire.

Excessive positive toe
causes the wear to start on the outer shoulder of the tire.

Excessive negative toe
causes the wear to start on the inner shoulder of the tire.

Individual toe
is the difference in distance from front and rear of one tire to a reference line

Incorrect total toe will wear tires extremely fast.

Excessive positive front total toe (toe-in) wear begins on the outer shoulder of both front tires.

Excessive negative total toe (toe-out) wear begins on the inner shoulder of both front tires.

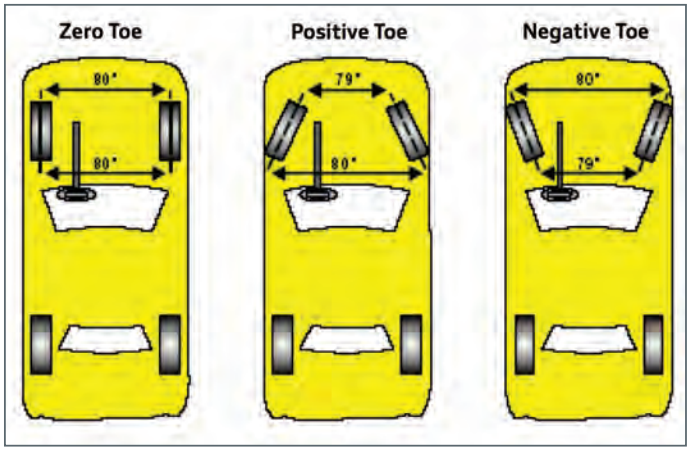
The toe wear pattern should be similar on both front tires.

Unequal individual toe on the rear axle may cause the tire tread to twist and squirm as the vehicle goes down the road.

This may cause the tires to develop a diagonal cupping pattern on the tread surface known as "Diagonal Wipe".

Rear individual toe cannot equalize.

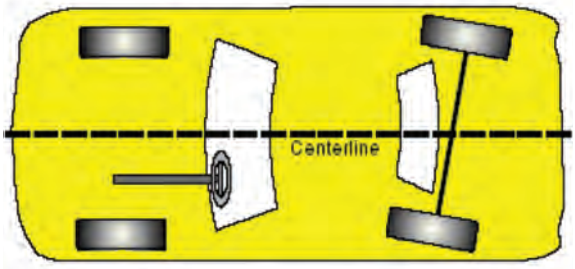
Each rear tire may have a different wear pattern.



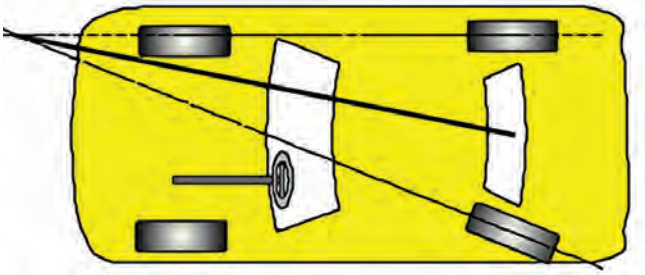
Excessive toe causes shoulder wear on the tire's tread

Diagonal Wipe

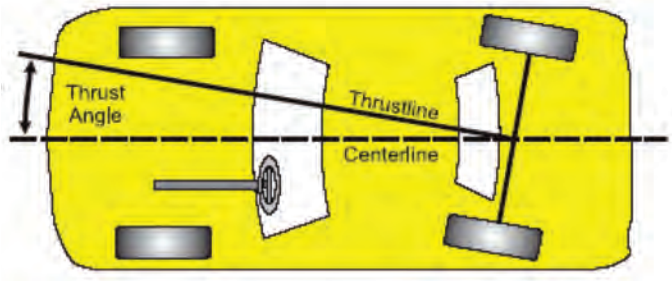
Toe Related Geometry



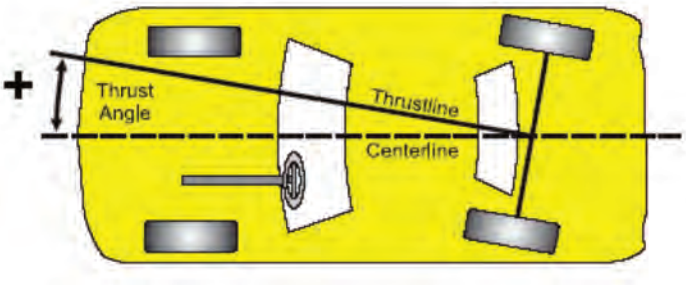
Geometric centerline is a line drawn through the midpoint of both front wheels and both rear wheels. Sensors on the same axle must be mounted using the same method.



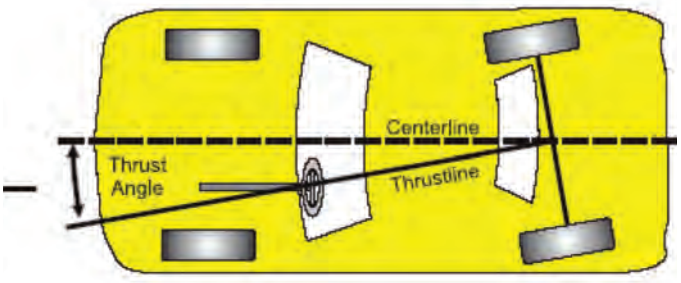
Thrust line is defined as a line bisecting the rear total toe angle—the direction the rear wheels point.



Thrust Angle is the angle formed by the intersection of the geometric centerline and the thrust line.



Positive thrust angle rear wheels point to the right of the geometric centerline.



Negative thrust angle rear wheels point to the left of the geometric centerline.

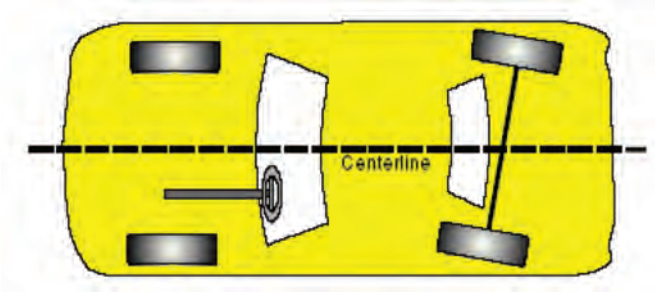
A thrust angle greater than 0° causes the vehicle to “dog track” as it goes down the road. Audi has established a thrust angle specification of 0° +/- 10’ for most vehicles.

A dog track condition is rarely associated with a vehicle pull problem.

Alignment Types

Centerline Alignment

A centerline alignment aligns the front wheels to the geometric centerline of the vehicle. Rear wheel toe is not measured.



All four sensors are mounted, but only the front sensors are compensated

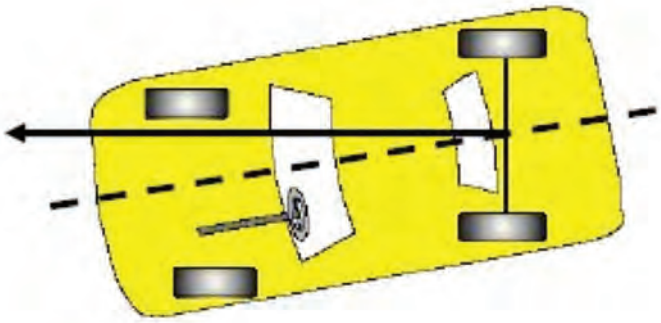
Result

- The vehicle dog tracks as it goes down the road
- The steering wheel is not centered
- Front camber and total toe may change as wheels steer to get in line with the vehicle's thrust angle

This alignment type should be avoided.

Thrustline Alignment

A thrust line alignment aligns the front wheels to the vehicle's thrust angle.



All four sensors are compensated, but the rear angles are not adjusted. Front wheels are adjusted in-line with the thrust angle.

Result

- The steering wheel is centered
- All front angle measurements are maintained
- The vehicle may dog track as it goes down the road

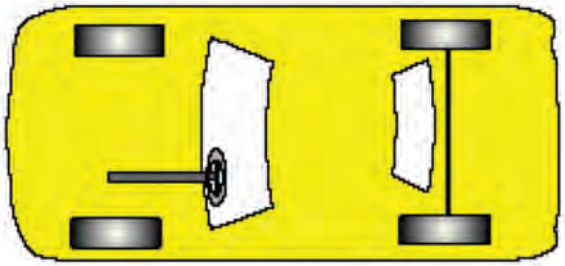
Although a thrust line alignment centers the steering wheel, the vehicle may still experience poor handling.

Appendix D

Total 4-Wheel Alignment

A total 4-wheel alignment aligns the rear wheels to the geometric center line and the front wheels to thrust line.

All four sensors are mounted and compensated. Rear wheels are adjusted to reduce thrust angle.



Results

- The vehicle's body goes straight down the road
- Steering wheel is centered
- All steering and suspension geometry is properly maintained.

A total 4-wheel alignment assures the vehicle will handle properly.

Always perform a total 4-wheel alignment on Audi vehicles.

Order of adjustment for Audi vehicles with lateral subframe shift

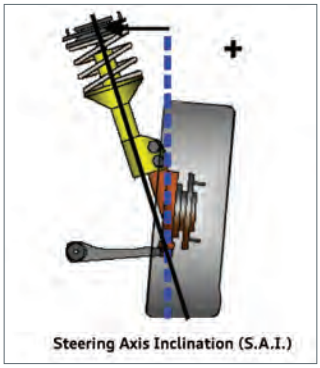
- Front camber (equalize with sub-frame)
- Rear camber (independent rear suspensions only)
- Rear toe (all models)
- Front toe (all models)

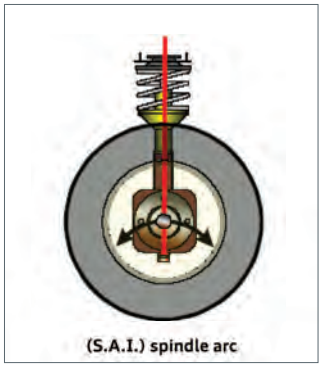
Order of adjustment for Audi vehicles without lateral subframe shift

- Rear camber
- Rear toe
- Front caster
- Front camber
- Front toe

Steering Axis Inclination and Included Angle

Steering Axis Inclination, or S.A.I., is the angle formed by a line drawn through the upper and lower pivot points of the spindle and a vertical line drawn from the lower pivot point.



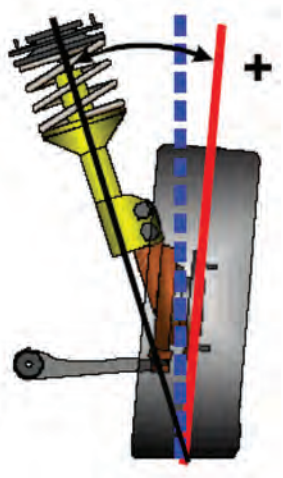


S.A.I. helps to increase directional stability and returnability

Both S.A.I. and IA are measured with caster or may be measured without caster by selecting “Measure Caster”, then press “Select Measurement”.

Included angle, or I.A. for short, is the combination of S.A.I. and camber. S.A.I. and I.A. measurements are useful diagnostics tools.

Large differences (usually over 1.5°) in included angle generally indicate a damage component between the two pivot points of the steering knuckle.



- Swing Arm (knuckle)
- Ball joint stud
- Hub assembly

Large differences in S.A.I. (usually over 1.5°) generally indicate one of the upper or lower pivot points of the swing arm are out of position or damaged.

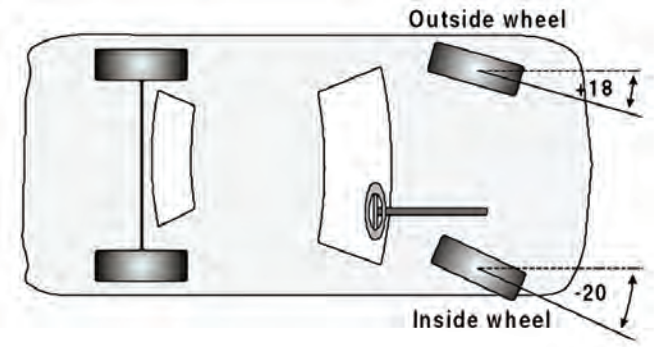
- Lower link rod (camber should be above spec)
- Upper link rod (camber should be below spec)
- Strut tower position (camber should be below spec)
- Sub-frame position (one camber above spec and one below spec)

Appendix D

Turning Angle

The inside wheel must turn sharper than the outside wheel to reduce tire scrubbing in the turn. This is accomplished through the Ackerman principal.

Turning angle is the arc a wheel travels during a turn.



The steering arms of the vehicle are designed to determine the relationship between the left and right front wheels when the vehicle is steered.

The steering arm connects the outer tie rod to the swing arm (steering knuckle).

The steering arm on the four-link suspension is an integral part of the swing arm (steering knuckle).

Turning angle measurements may be used to diagnose a bent steering arm.

Turning Angle Measurement

Turning angle is measured by steering the inside wheel to the outside a specified amount then checking the angle of the wheel on the outside of the turn.

Front	Spec.	-Tol.	+Tol.
Left Turn Diff.	-1°12'	0°30'	0°30'
Right Turn Diff.	-1°12'	0°30'	0°30'
Cross Turn Diff.			
Turn Reference	-20°00'		

Diagnosing Turning Angle

1. Measure the turning angle difference for a left and right turn.
2. Determine which turn yields an out-of-spec result.
3. Inspect the steering arm on that side.

Front	Left	Right
Included Angle	0°30'	0°30'
Steer Ahead	0°00'	
Set Back		
Turning Angle Diff.	-1°41'	-2°17'
Cross Turn Diff.	0°36'	

Maximum Steering Angle

Maximum steering angle is the angle of the front wheels when turned to the inward and outward lock position.

A wheel that turns beyond the maximum steering angle may create hazardous conditions when driving and cause premature tire wear.

Maximum steering angle is measured twice during the alignment process. The measurement is used to calculate the rack's center position during the steering wheel position procedure.

The steering wheel must be removed and installed centered, if the level condition is more than 4 ½° off with the gear box centered.

Electronic turn plates are required if using DSP208, DSP258, DSP308 and DSP508 sensors.

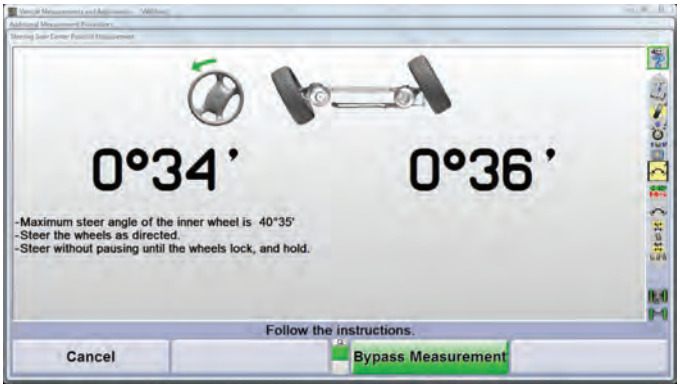
Sensors using camera technology do not require electronic turnplates.

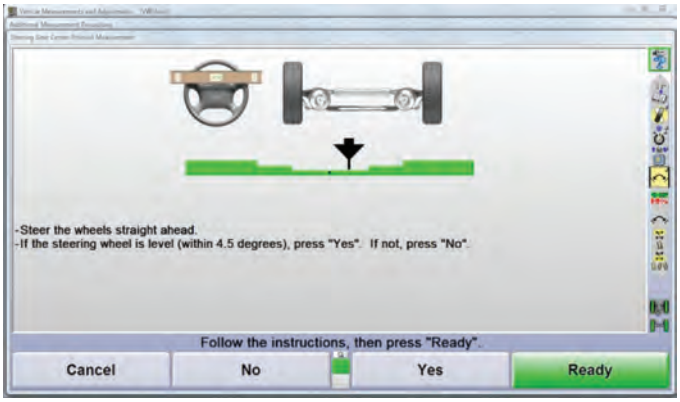
Compare the negative numbers for maximum steer on the secondary measurement display.

The numbers should be relatively equal and close to the specification, if given.

Gross measurement errors may suggest an off-center steering gear box or damaged linkage.

This soft key will be available from the "Measurements and Adjustments" display by accessing the third row of soft keys.




-Steer the wheels straight ahead.
-If the steering wheel is level (within 4.5 degrees), press "Yes". If not, press "No".
Follow the instructions, then press "Ready".
Cancel
No
Yes
Ready

Front	Left		Right
Included Angle	0°30'		0°30'
Steer Ahead		0°00'	
Set Back		-0°10'	
Turning Angle Diff.	0°00'		0°00'
Cross Turn Diff.		0°00'	
Ride Height			
Maximum Left Steer	-37°55'		38°14'
Maximum Right Steer	37°36'		-37°17'

Appendix D

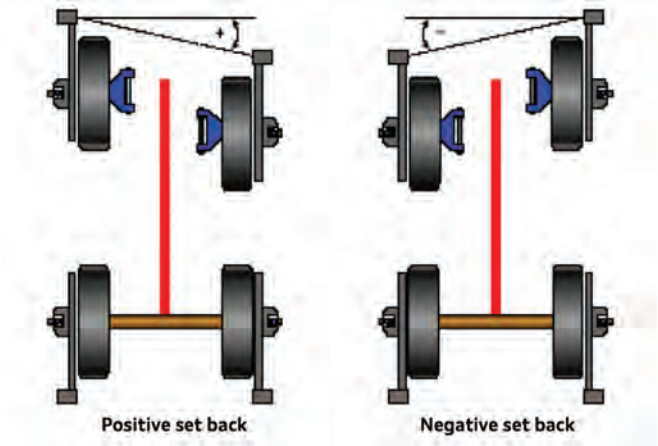
Setback

Front Setback

Angle formed by a line drawn perpendicular to centerline and a line connecting the centers of the front wheels.

Positive setback indicates the right front wheel is behind the left front wheel.

Negative setback indicates the left front wheel is behind the right front wheel.



What can cause an excessive set back angle?

- Shifted or damaged cradle
- Bent lower link
- Uni-body damage

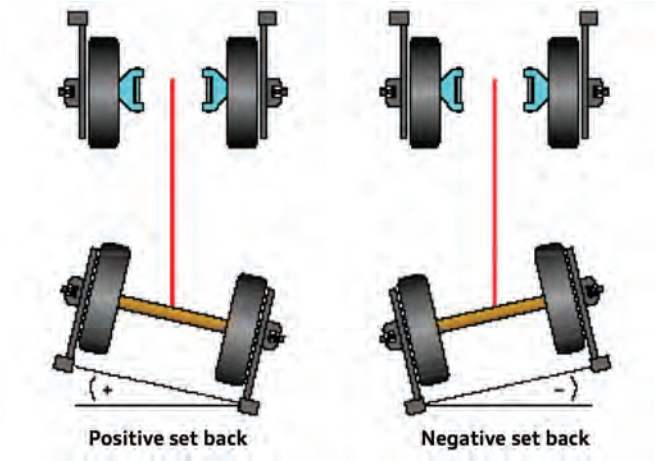
What is considered normal for set back?

- No specification is given for set back
- Zero is considered preferred
- The industry typically accepts a tolerance of ±0°30’

Rear Setback

Angle formed by a line drawn perpendicular to centerline and a line connecting the centers of the front wheels.

Positive = right rear trails left rear
Negative = left rear trails right rear



Wheelbase and Track Width Measurements

The wheelbase and track width measurements can be a helpful indicator of potential problems in the vehicle's suspension and uni-body. We recommend you verify any suspect measurements with a linear measuring device such as a tram bar or tape measure.

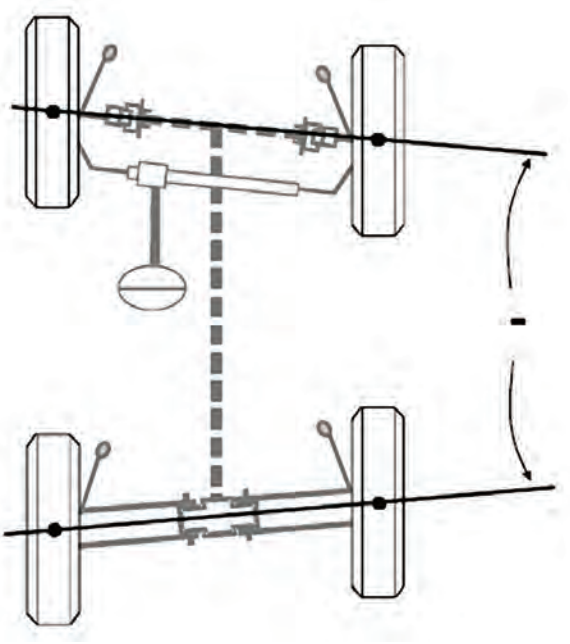
Find and select "Make Additional Measurements" from the soft key menu. Select "Wheel base and Track Width Measurements" from the menu and follow the instructions.

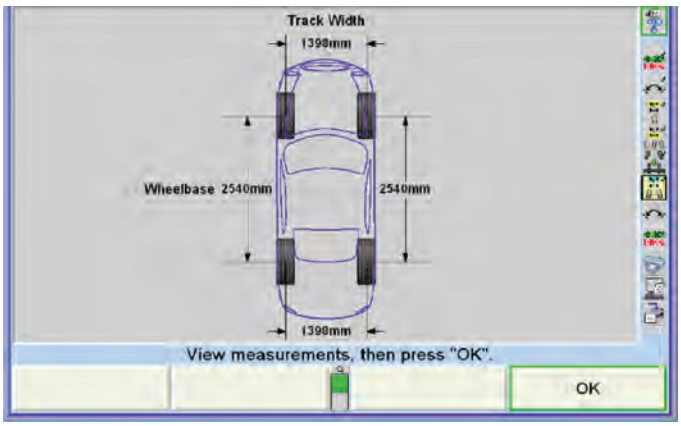
Wheelbase difference is an angle formed by a line connecting the centers of the front wheels and a line connecting the centers of the rear wheels.

A positive wheelbase difference indicates that the right wheelbase is longer than the left wheelbase.

A negative wheelbase difference indicates that the left wheelbase is longer than the right wheelbase.

Wheelbase difference is measured as an angle but may be displayed in inches or millimeters if the track width is available in the vehicle specification data.





Post Alignment Calibrations requiring Alignment Measurements

Electronic Stability Control (ESP) (SSP 961903)

The Electronic Stability Program (ESP) is a vehicle safety feature known also as a “driving dynamic control system.”

ESP’s primary purpose is to maintain vehicle stability by applying any given brake on the vehicle to correct a handling condition determined as dangerous.

The three primary concerns are as follows:
1. Understeer
2. Oversteer
3. Flip-over

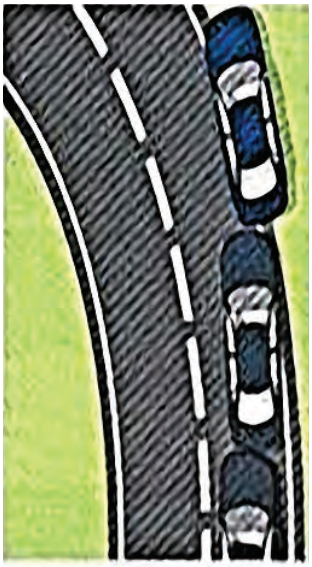
Understeer occurs when the front tires break free of the road surface sooner than the rear tires,The momentum of the vehicle keeps it moving in the original direction of vehicle travel. Steering control is lost.

Understeer may be avoided by activating a rear brake on the inside of the corner along with engine and transmission management systems regulating engine RPM gear selection.

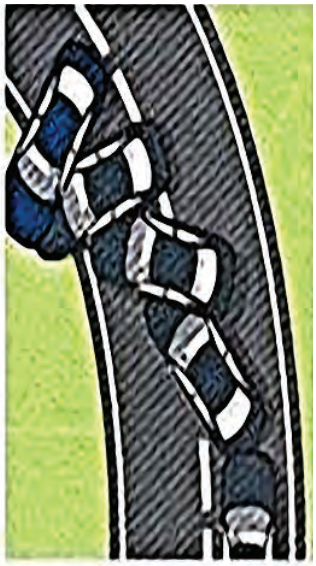
Oversteer occurs when the rear tires break free of the road surface during a turn sooner than the front wheels. This causes the back of the vehicle to pivot around the front, which is often called “fish tiling”.

Oversteer may be avoided by activating the front brake on the outside corner along with engine and transmission management systems regulating RPM and gear selection.

Either understeer or oversteer conditions may result in the vehicle flipping over.



Understeer

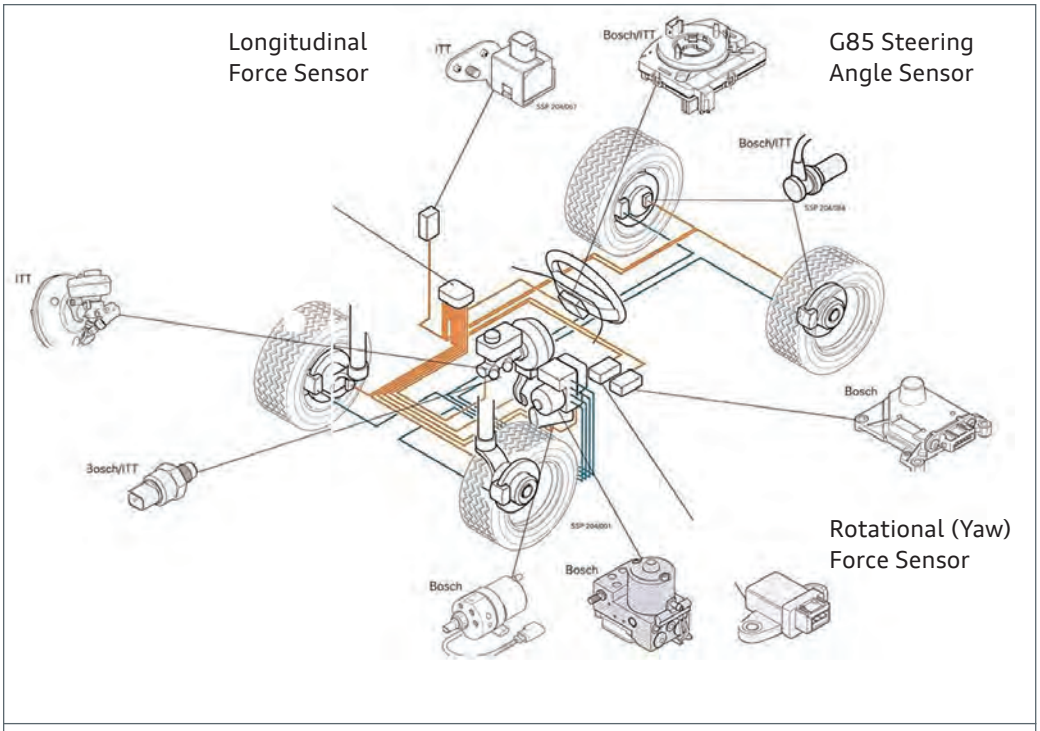


Oversteer

Two different ESP systems are used for Audi vehicles.
- Bosch: Audi A8, A6 and A4
- ITT Automotive: Audi 3 (Europe Only) and Audi TT

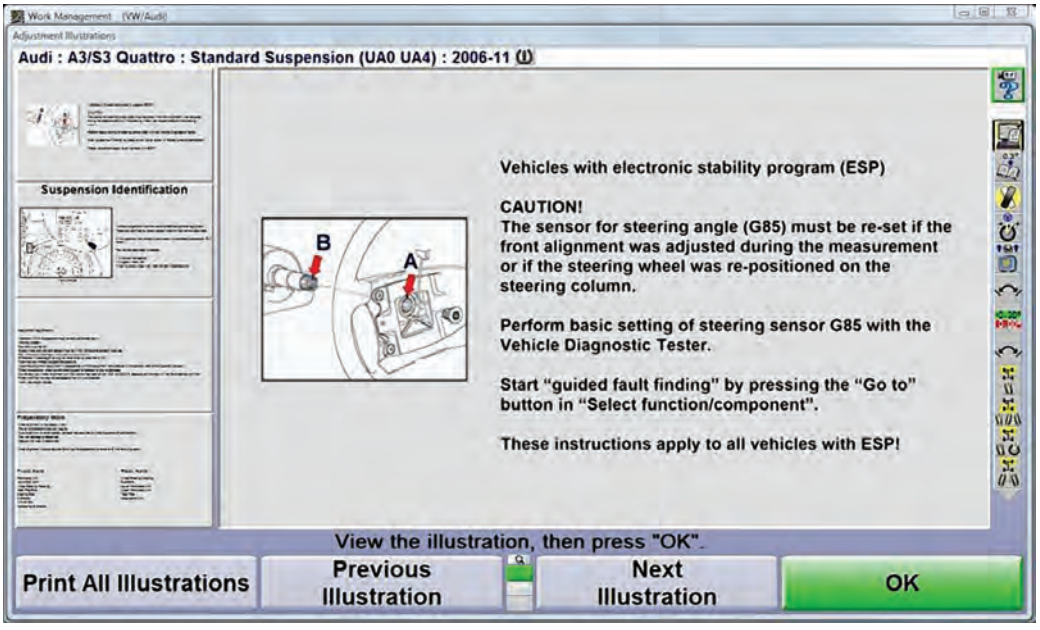
ESP is not an independent system. A variety of sensors and other hardware is needed to make the system possible.

A multitude of sensors and other components work together to complete the system.



ESP Components

Audi vehicles equipped with ESP may require a post-alignment procedure to calibrate the steering angle sensor and associated sensors.


Work Management (VW/Audi)
Adjustment Illustrations
Audi : A3/S3 Quattro : Standard Suspension (UA0 UA4) : 2006-11
Suspension Identification
B
A
Vehicles with electronic stability program (ESP)
CAUTION!
The sensor for steering angle (G85) must be re-set if the front alignment was adjusted during the measurement or if the steering wheel was re-positioned on the steering column.
Perform basic setting of steering sensor G85 with the Vehicle Diagnostic Tester.
Start "guided fault finding" by pressing the "Go to" button in "Select function/component".
These instructions apply to all vehicles with ESP!
View the illustration, then press "OK".
Print All Illustrations
Previous Illustration
Next Illustration
OK

Appendix E

Dynamic Steering (SSP 992803)

In conventional steering systems there is a direct mechanical connection between the steering wheel and the steering gear. This also means there is a given relationship between the steering wheel angle and the lock angle of the steered wheels.

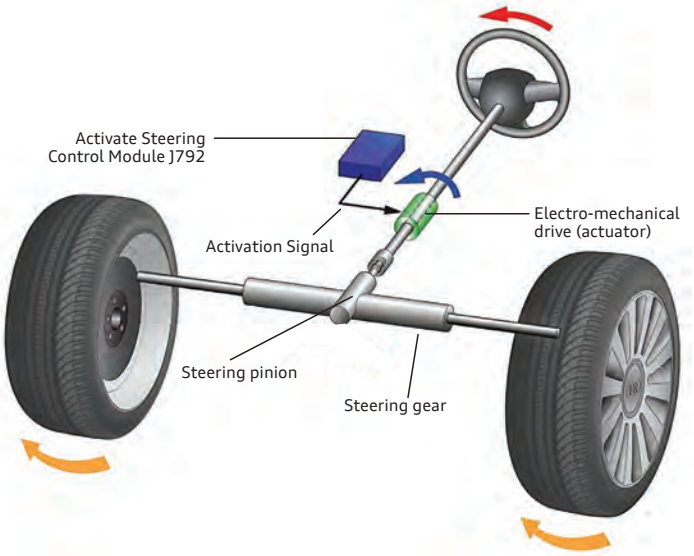
The 2009 Audi A4 was the first Audi model to use the Dynamic Steering System.

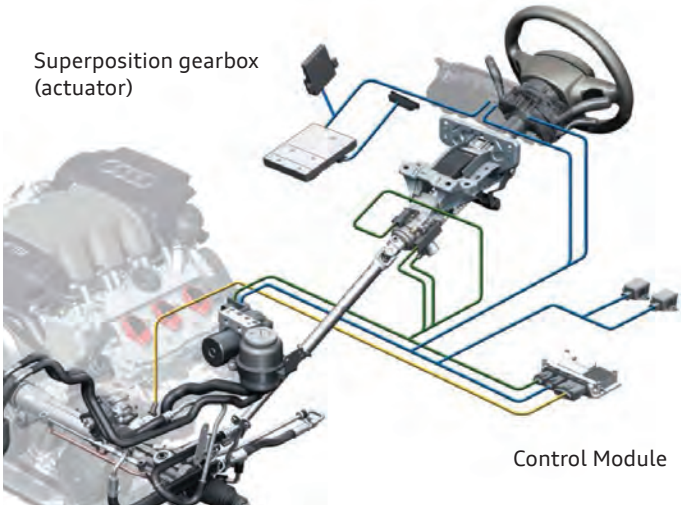
The dynamic steering system provides a suitable steering ratio for every situation whether parking, driving on windy country roads or at high speed on an expressway.

Over and above this, the dynamic steering system assists the ESP system in specific driving situations by implementing corrective steering inputs which serve to maintain dynamic stability.

ESP utilizes the dynamic steering function in both oversteer and understeer situations, as well as under braking on road surfaces with different friction

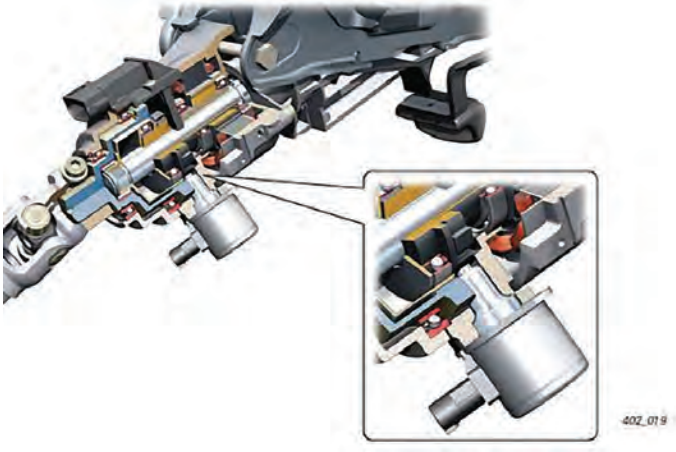
The variable characteristic curve is of Dynamic Steering is implemented by an additional electro-mechanical drive steering pinion, which is super-imposed on the driver's steering input.





To represent a fail-safe mode in the event of a system fault or failure, the dynamic steering gear can be locked (disabled) mechanically.

- During normal operation, the lock is engaged whenever the engine is switched off.
- When the engine is started, the dynamic steering system is unlocked, as indicated by an audible "click" noise.
- Locking is provided by a solenoid bolted onto the gearbox housing.
- In the event of a failure of this drive, the vehicle steering system functions exactly the same as a conventional steering system



The control module determines whether an increase or reduction in steering angle is needed. The control module activates an electric motor, which drives the superposition gearbox. The total steering angle of the wheels is determined from the total overlap angle and the driver's steering input. The overlap angle can:

- increase the driver's steering input,
- reduce the driver's steering input,
- implement a steering angle without any steering input from the driver.

Steering Angle Sensor G85A key input signal is that of momentary steering angle. This signal is required both for calculating the overlap angle required to obtain the variable steering ratio and for calculating the overlap angle necessary to stabilize the vehicle. For this reason, the information is read in by both control modules J104 and J792.

G85 Steering Angle Sensor

Function and Fault Indication

A warning lamp integrated in the tachometer serves the dynamic steering system as a function and fault indicator. Warning text is also shown in the center display of the instrument cluster.

The diagnostic warning lamp is checked when the ignition is switched on. The warning lamp remains activated until the engine is started. When the engine is running, the dynamic steering system is activated by releasing the lock.

The following deviations from a normal system response can occur.

The vehicle's steering response has been modified.

- When driving at low speeds, more steering input may be necessary.
- At high speeds, the vehicle may respond more sensitively to steering inputs.

The stabilizing functions of the dynamic steering system are no longer are available.

- The steering wheel may be at an angle when driving in a straight line.
- In the event of serious system faults, all functions of the dynamic steering system are disabled.

The basic setting procedure teaches the active steering control module, once only, the assignments of the measured values of the steering angle sender (=steering wheel position), of the motor position sensor (position of the eccentricity) and the index sensor (position of the steering gear pinion). In the case of new vehicles, the individual sensor signals are assigned to each other at the factory. These assignments are, therefore, a basic requirement for the initialization and also for ensuring that the steering wheel is aligned straight when driving in a straight line on a level road surface.

The Basic Setting Procedure must be carried out with utmost care.

The basic setting procedure must be performed in the service workshop after:

- installing a new / different Active Steering Control Module J792
- installing a new / different steering column
- installing a new / different steering angle sensor G85
- after recalibrating the steering angle sensor
- changing the wheel alignment values

Appendix E

The Basic Setting Procedure is required if toe has been adjusted on the vehicle.

Select “Basic setting” function in the Guided Fault Finding menu of the scan tool.

The steering angle sensor is calibrated before starting the actual basic setting procedure. The calibration is done using the new special tool, VAS 6458.

After the steering angle sensor calibration, control module J792 knows the steering angle at which the steering wheel is aligned perfectly straight.

A wheel alignment rack is required when performing the calibration procedure.

1. The front wheels are moved into the position, which is defined by “identical individual toe values relative to geometric drive axis”. (next image)

2. In this position, the control module J792 utilizes the motor position sensor to determine the momentary steering angle, as well as the position of the dynamic steering system’s electric motor.

3. The position of the index sensor relative to the associated steering angles is determined by subsequent steering wheel movements about the center position.

4. The difference between the steering angles is determined for identical individual toe values relative to the geometric drive axis and steering angle when the steering wheel is aligned straight.

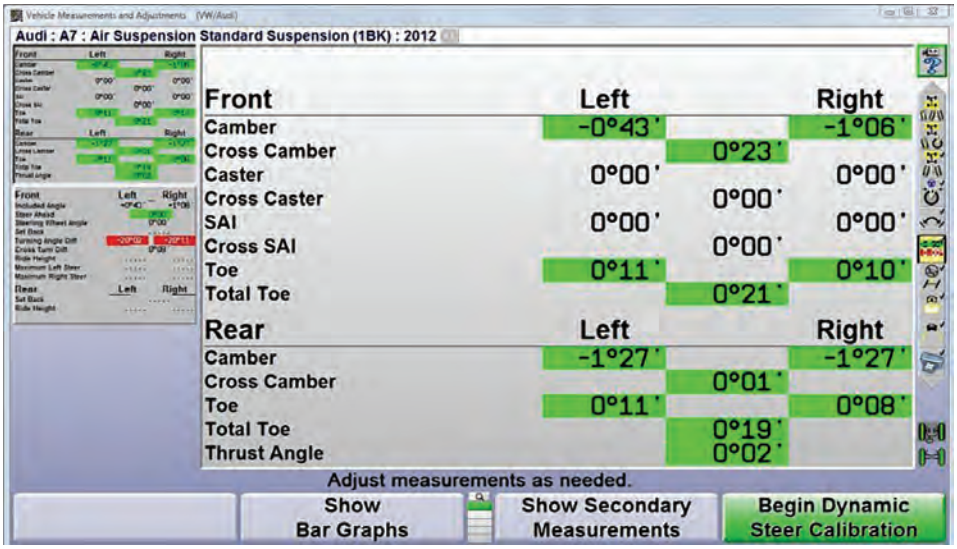
5. The steering wheel angle is then corrected automatically by control module J792 via activation of the electric motor. This ensures that the steering wheel is aligned straight when driving in a straight line.

A prerequisite for basic setting is an encoded control module J792.

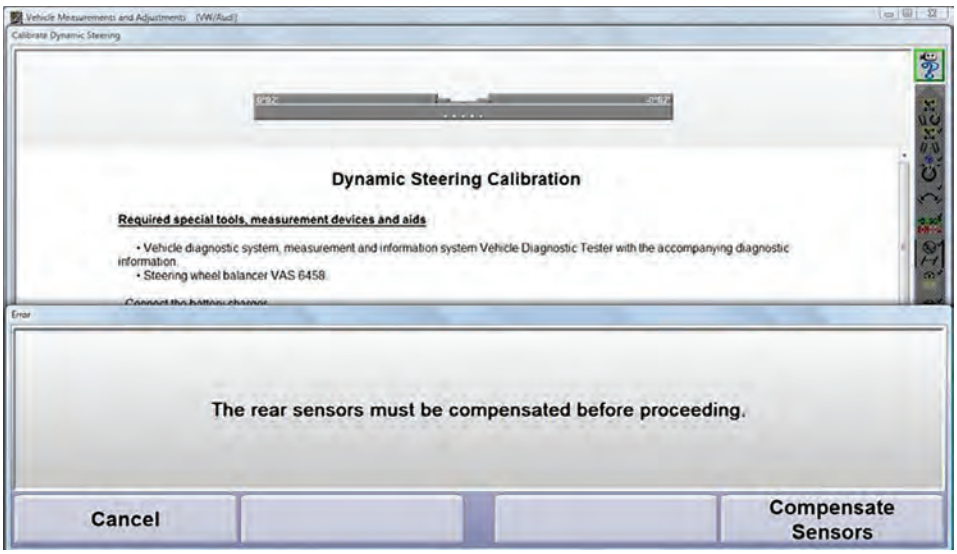
Refer to SSP 992803 for proper service procedures to perform the calibration service.

Dynamic Steering Calibration Procedure with WinAlign® Software

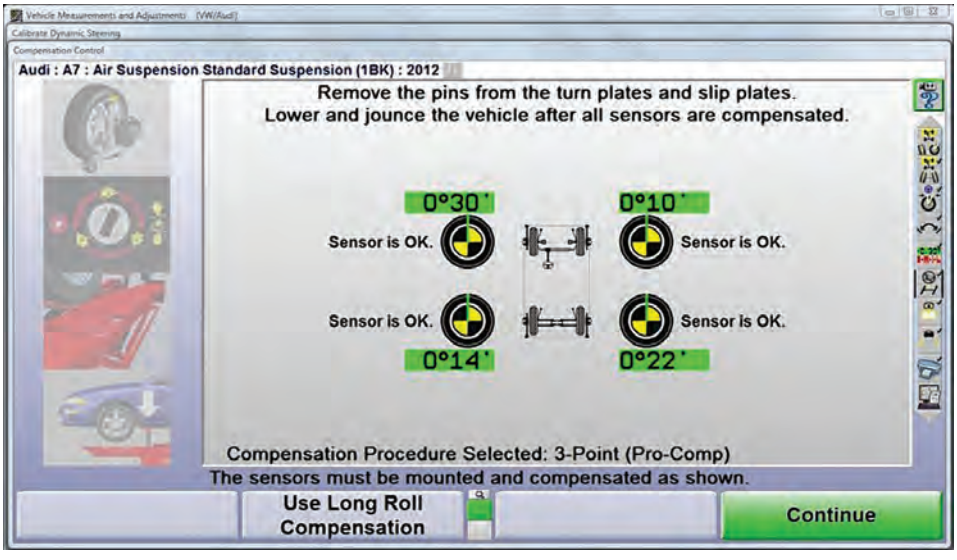
Select K-4 “Begin Dynamic Steer Calibration”.



Compensate rear sensors as required, Select K-4 to continue.

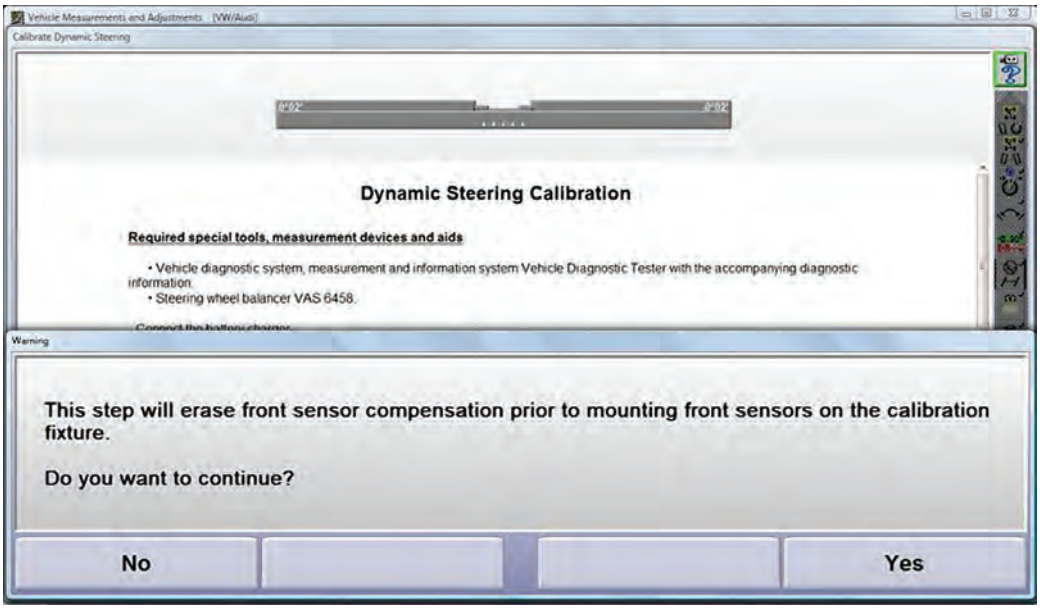

Dynamic Steering Calibration
Required special tools, measurement devices and aids
• Vehicle diagnostic system, measurement and information system Vehicle Diagnostic Tester with the accompanying diagnostic information
• Steering wheel balancer VAS 6458
The rear sensors must be compensated before proceeding.
Cancel
Compensate Sensors

Press K-4 to continue.

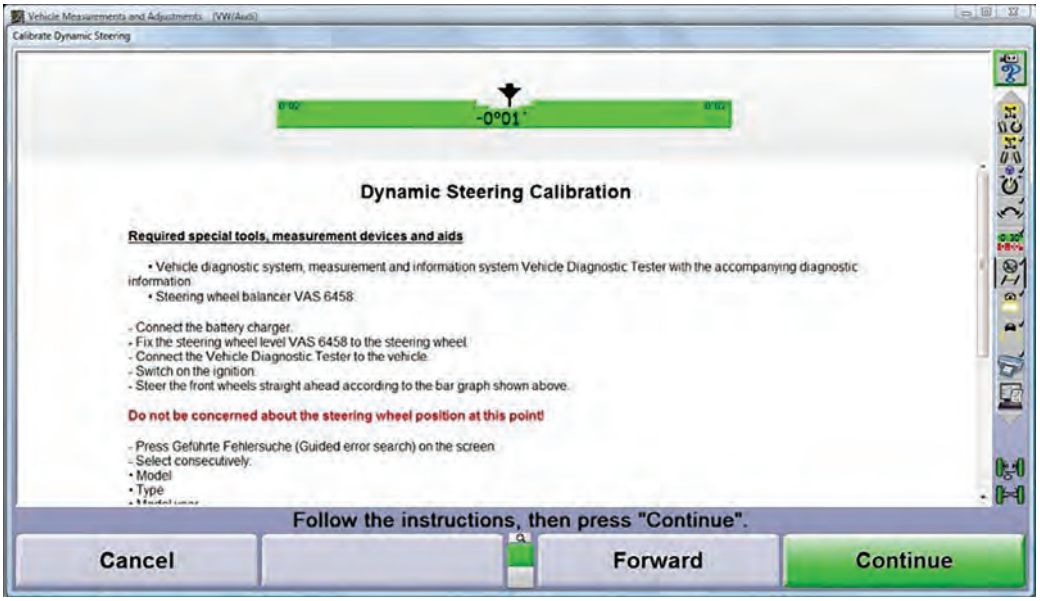

Audi : A7 : Air Suspension Standard Suspension (1BK) : 2012
Remove the pins from the turn plates and slip plates.
Lower and jounce the vehicle after all sensors are compensated.
0°30'
Sensor is OK.
0°10'
Sensor is OK.
Sensor is OK.
0°14'
Sensor is OK.
0°22'
Compensation Procedure Selected: 3-Point (Pro-Comp)
The sensors must be mounted and compensated as shown.
Use Long Roll Compensation
Continue

Appendix E

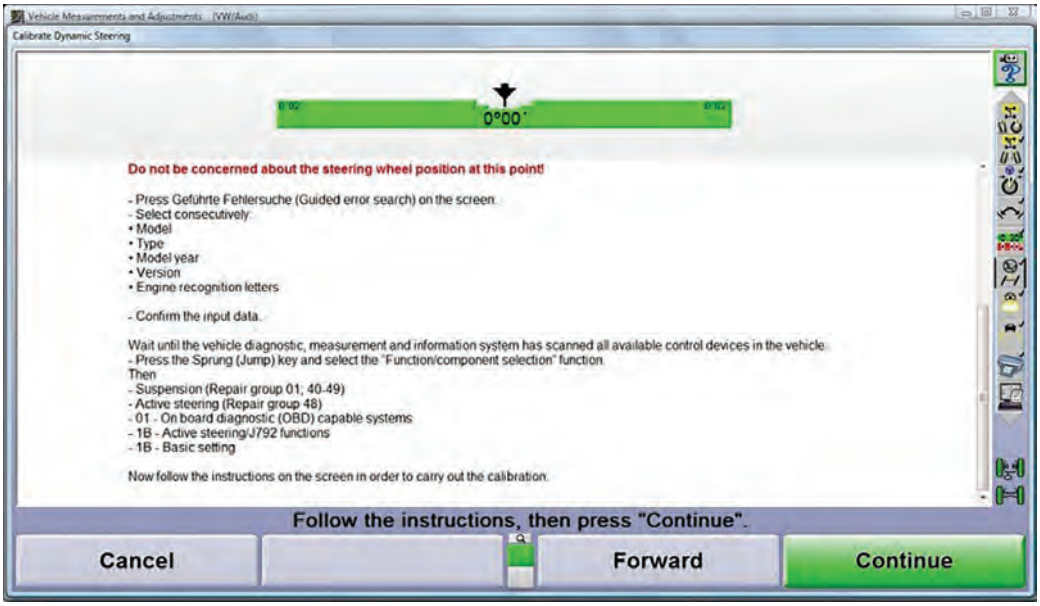
Select “Yes”. This display may appear if rolling compensation was performed.


Vehicle Measurements and Adjustments (VW/Audi)
Calibrate Dynamic Steering
Dynamic Steering Calibration
Required special tools, measurement devices and aids
• Vehicle diagnostic system, measurement and information system Vehicle Diagnostic Tester with the accompanying diagnostic information
• Steering wheel balancer VAS 6458
Warning
This step will erase front sensor compensation prior to mounting front sensors on the calibration fixture.
Do you want to continue?
No
Yes

Follow the screen instructions carefully. Be sure to scroll sown to read all of the instructions.


Vehicle Measurements and Adjustments (VW/Audi)
Calibrate Dynamic Steering
-0°01'
Dynamic Steering Calibration
Required special tools, measurement devices and aids
• Vehicle diagnostic system, measurement and information system Vehicle Diagnostic Tester with the accompanying diagnostic information
• Steering wheel balancer VAS 6458
- Connect the battery charger.
- Fix the steering wheel level VAS 6458 to the steering wheel.
- Connect the Vehicle Diagnostic Tester to the vehicle.
- Switch on the ignition.
- Steer the front wheels straight ahead according to the bar graph shown above.
Do not be concerned about the steering wheel position at this point!
- Press Geführte Fehlersuche (Guided error search) on the screen.
- Select consecutively:
• Model
• Type
Follow the instructions, then press "Continue".
Cancel
Forward
Continue

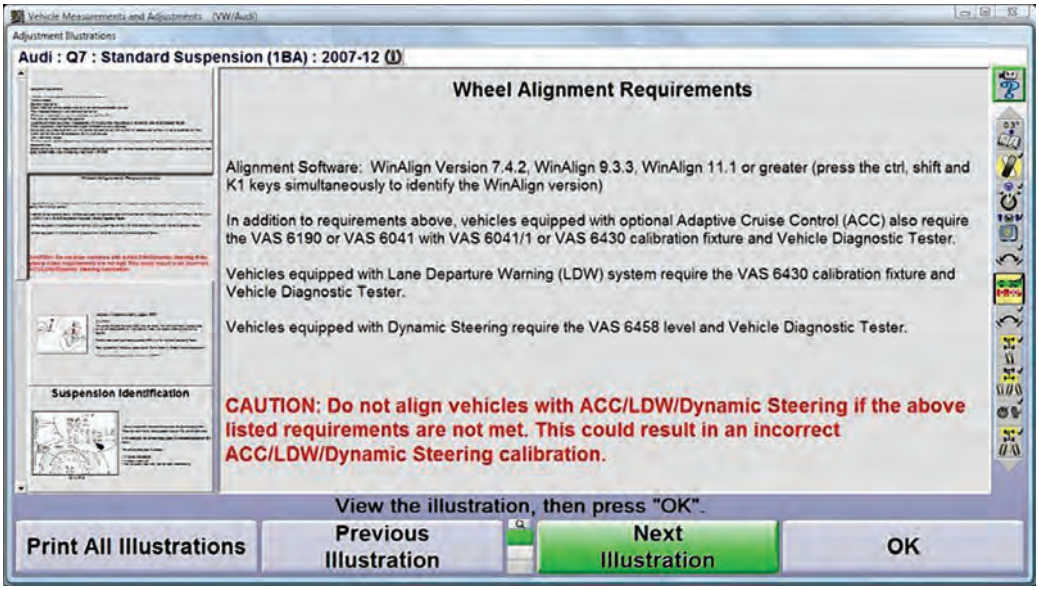
After following all of the instructions, press K-4 to continue. A note may be placed at the bottom of the printout indication the Dynamic Steering calibration was performed.


Vehicle Measurements and Adjustments (VW/Audi)
Calibrate Dynamic Steering
0°00'
Do not be concerned about the steering wheel position at this point!
- Press Geführte Fehlersuche (Guided error search) on the screen.
- Select consecutively:
• Model
• Type
• Model year
• Version
• Engine recognition letters
- Confirm the input data.
Wait until the vehicle diagnostic, measurement and information system has scanned all available control devices in the vehicle.
- Press the Sprung (Jump) key and select the "Function/component selection" function.
Then
- Suspension (Repair group 01; 40-49)
- Active steering (Repair group 48)
- 01 - On board diagnostic (OBD) capable systems
- 1B - Active steering/J792 functions
- 1B - Basic setting
Now follow the instructions on the screen in order to carry out the calibration.
Follow the instructions, then press "Continue".
Cancel
Forward
Continue

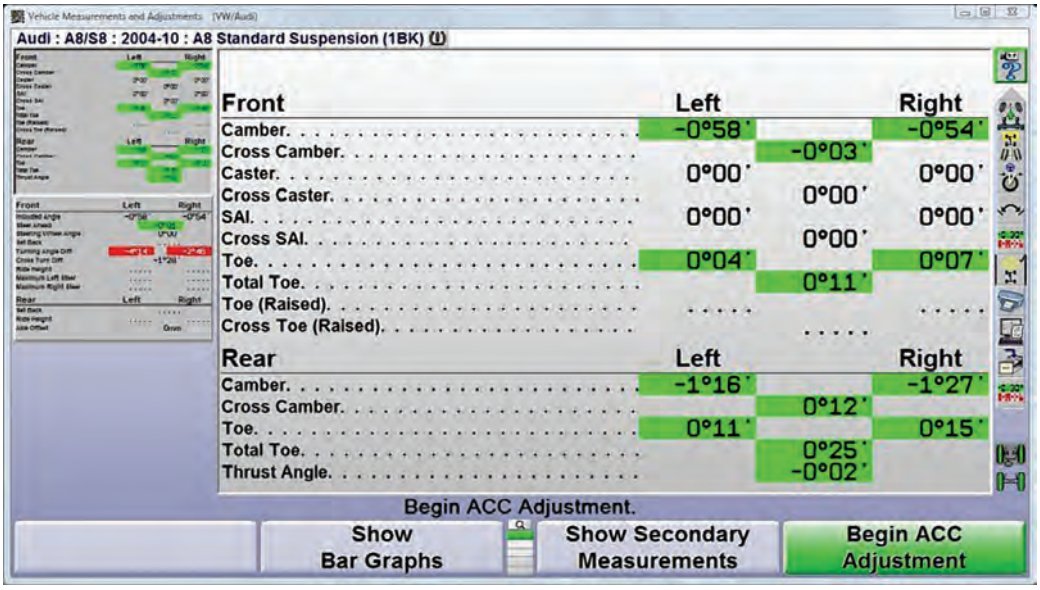
Adaptive Cruise Control (ACC) SSP 970203

Vehicles equipped with adaptive Cruise control will require a calibration procedure at the end of the alignment procedure.

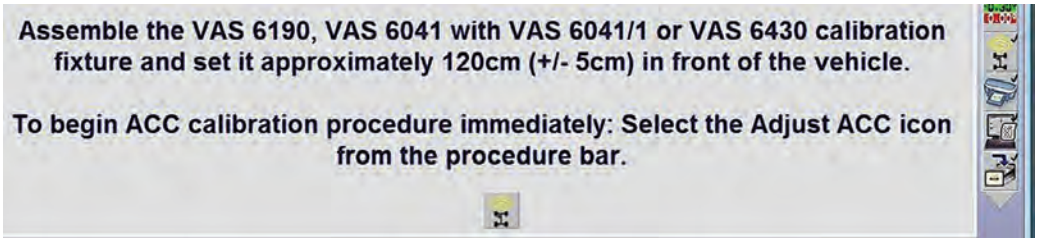
This information screen indicates the proper equipment needed when aligning a vehicle equipped with ACC.


Vehicle Measurements and Adjustments (VW/Audi)
Adjustment Illustrations
Audi : Q7 : Standard Suspension (1BA) : 2007-12
Wheel Alignment Requirements
Alignment Software: WinAlign Version 7.4.2, WinAlign 9.3.3, WinAlign 11.1 or greater (press the ctrl, shift and K1 keys simultaneously to identify the WinAlign version)
In addition to requirements above, vehicles equipped with optional Adaptive Cruise Control (ACC) also require the VAS 6190 or VAS 6041 with VAS 6041/1 or VAS 6430 calibration fixture and Vehicle Diagnostic Tester.
Vehicles equipped with Lane Departure Warning (LDW) system require the VAS 6430 calibration fixture and Vehicle Diagnostic Tester.
Vehicles equipped with Dynamic Steering require the VAS 6458 level and Vehicle Diagnostic Tester.
Suspension Identification
CAUTION: Do not align vehicles with ACC/LDW/Dynamic Steering if the above listed requirements are not met. This could result in an incorrect ACC/LDW/Dynamic Steering calibration.
View the illustration, then press "OK".
Print All Illustrations
Previous Illustration
Next Illustration
OK

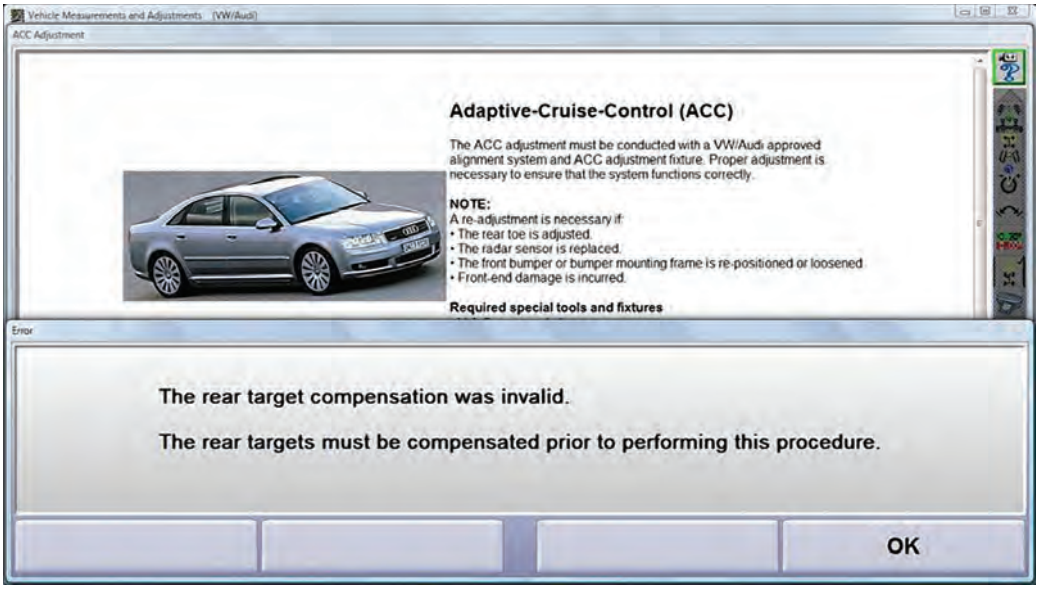
The WinAlign® software is programmed to introduce the calibration procedure near the end of the alignment process. The soft key titled “Begin ACC Adjustment” will appear.



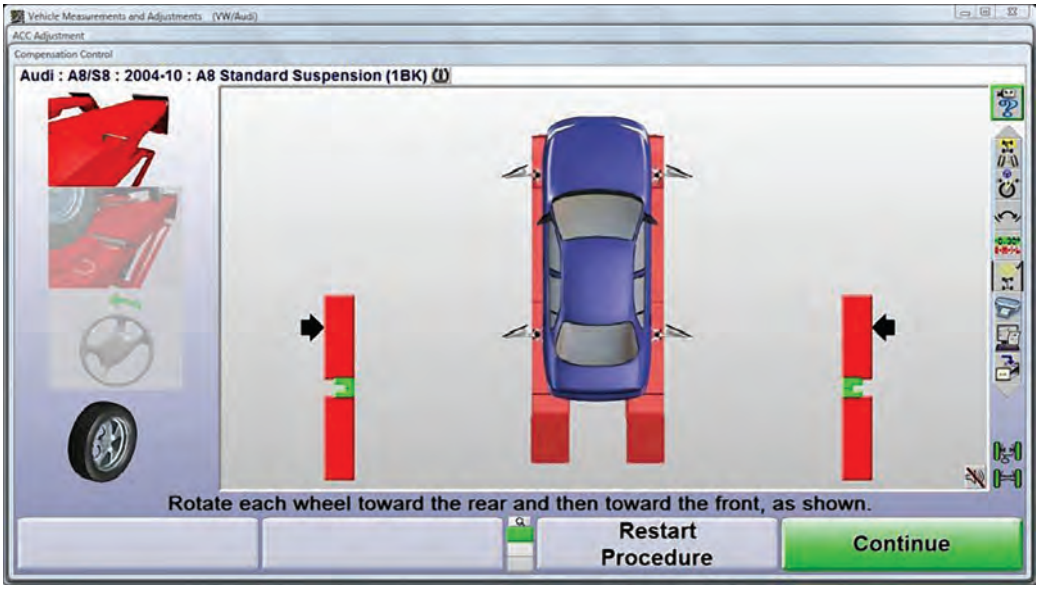
NOTE: It is possible to begin the calibration of the ACC system without performing a complete alignment. The procedure bar on the far right side of the alignment display contains an icon for the ACC calibration procedure. Left click this icon to launch the ACC calibration process at any time. This is normally used when the vehicle has been recently aligned.


Assemble the VAS 6190, VAS 6041 with VAS 6041/1 or VAS 6430 calibration fixture and set it approximately 120cm (+/- 5cm) in front of the vehicle.
To begin ACC calibration procedure immediately: Select the Adjust ACC icon from the procedure bar.

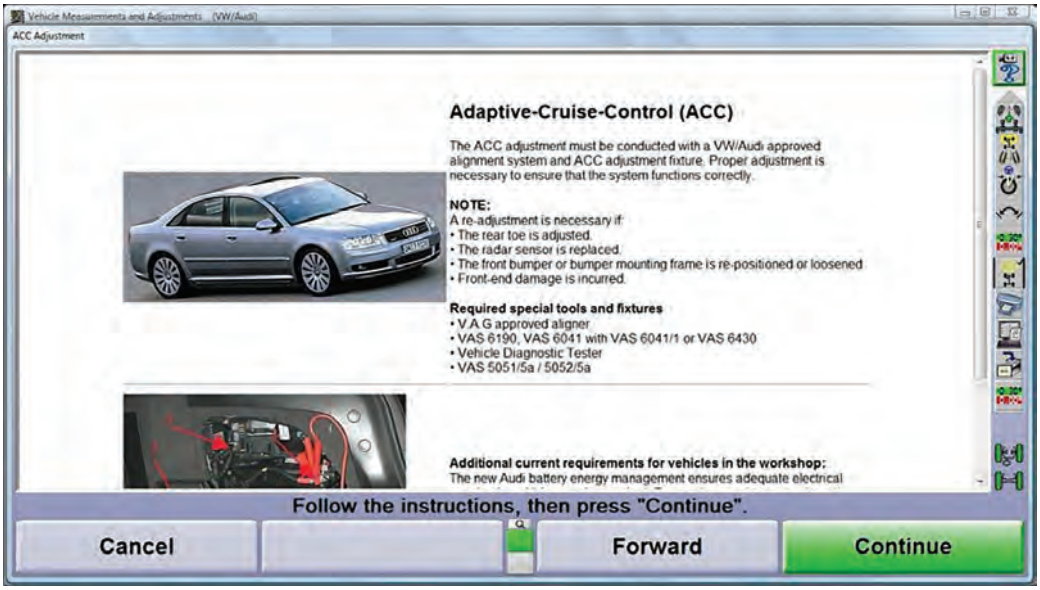
Compensate the rear sensors as instructed,


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
Adaptive-Cruise-Control (ACC)
The ACC adjustment must be conducted with a VW/Audi approved alignment system and ACC adjustment fixture. Proper adjustment is necessary to ensure that the system functions correctly.
NOTE:
A re-adjustment is necessary if:
• The rear toe is adjusted.
• The radar sensor is replaced.
• The front bumper or bumper mounting frame is re-positioned or loosened.
• Front-end damage is incurred.
Required special tools and fixtures
Error
The rear target compensation was invalid.
The rear targets must be compensated prior to performing this procedure.
OK

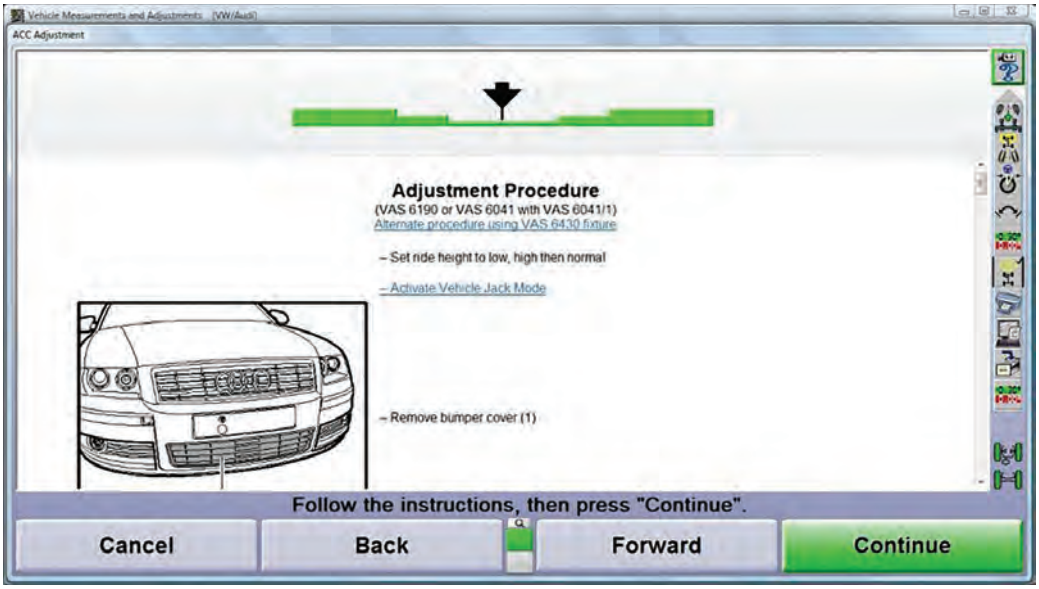
Press K-4 Continue after compensating the rear sensors.


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
Compensation Control
Audi : A8/S8 : 2004-10 : A8 Standard Suspension (1BK)
Rotate each wheel toward the rear and then toward the front, as shown.
Restart Procedure
Continue

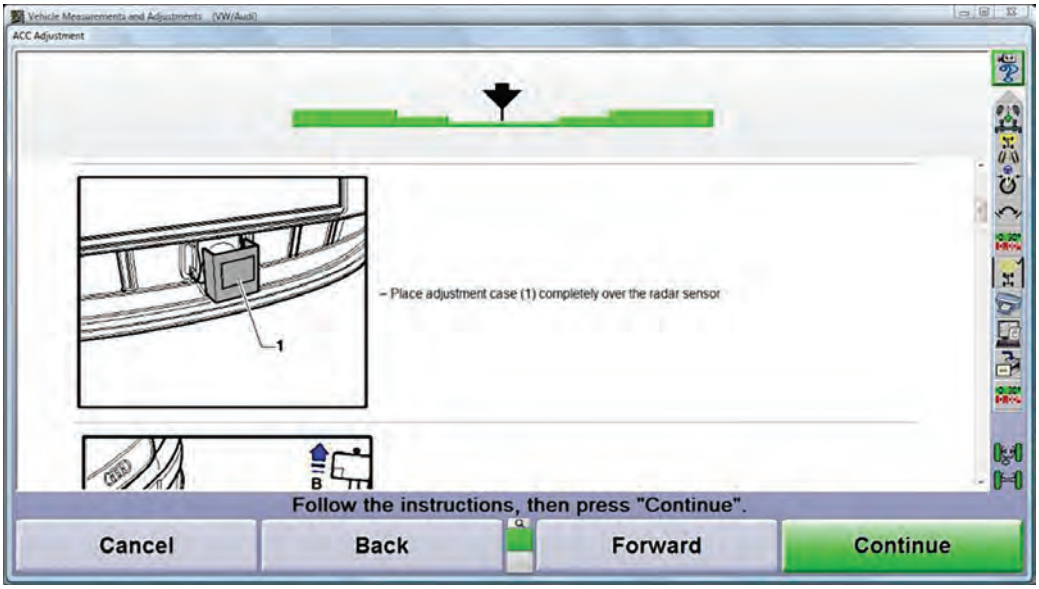
Read the instructions carefully. Be certain to scroll down to read all the information! Connect a VAS 5095 (3) battery charger to the battery and place the charger in “Support” mode,


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
Adaptive-Cruise-Control (ACC)
The ACC adjustment must be conducted with a VW/Audi approved alignment system and ACC adjustment fixture. Proper adjustment is necessary to ensure that the system functions correctly.
NOTE:
A re-adjustment is necessary if:
• The rear toe is adjusted.
• The radar sensor is replaced.
• The front bumper or bumper mounting frame is re-positioned or loosened.
• Front-end damage is incurred.
Required special tools and fixtures
• V.A.G approved aligner
• VAS 6190, VAS 6041 with VAS 6041/1 or VAS 6430
• Vehicle Diagnostic Tester
• VAS 5051/5a / 5052/5a
Additional current requirements for vehicles in the workshop:
The new Audi battery energy management ensures adequate electrical
Follow the instructions, then press "Continue".
Cancel
Forward
Continue

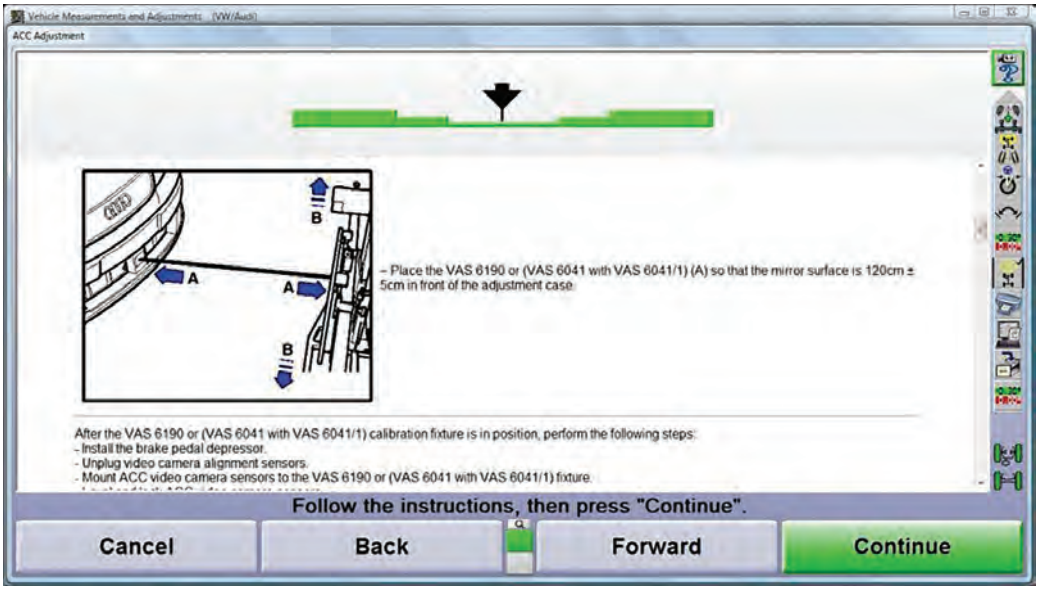
Read and follow the instructions on the display. Activate the "Jack mode" for vehicles equipped with an air ride suspension. Remove the bumper cover.


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
Adjustment Procedure
(VAS 6190 or VAS 6041 with VAS 6041/1)
Alternate procedure using VAS 6430 fixture
– Set ride height to low, high then normal
– Activate Vehicle Jack Mode
– Remove bumper cover (1)
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Place the adjustment case completely over the radar sensor.

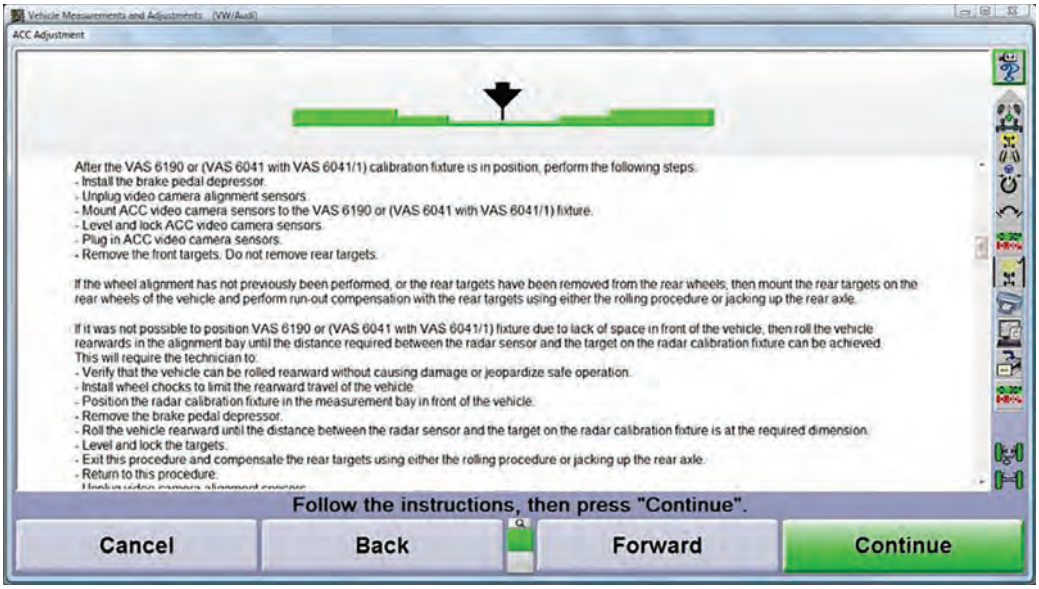


Place the appropriate VAS fixture in front of the vehicle at the proper distance; Follow the instructions given on the display. Scroll down to continue the procedure.

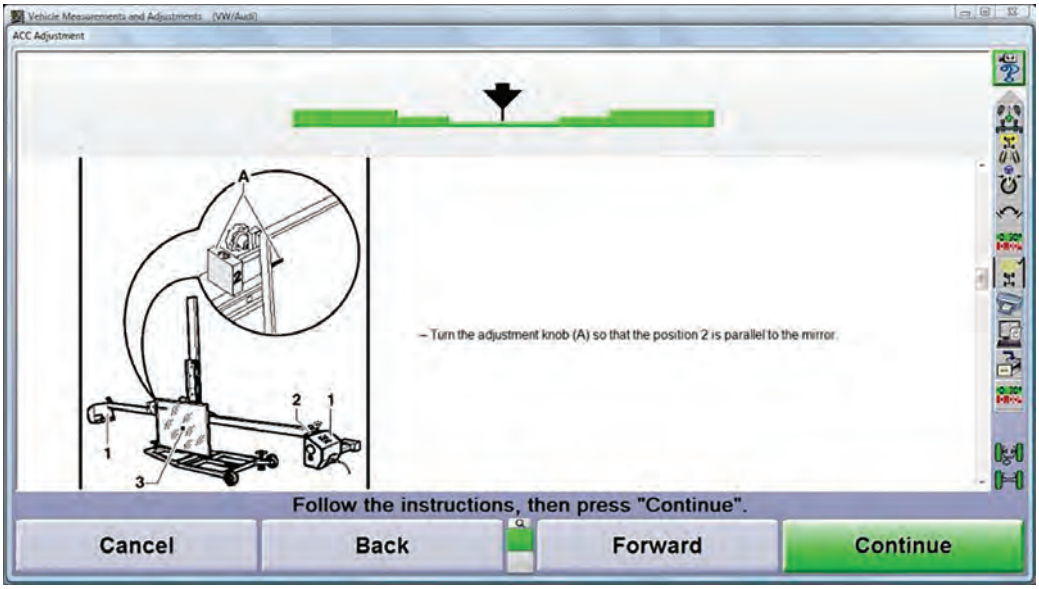

Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
B
A
A
B
– Place the VAS 6190 or (VAS 6041 with VAS 6041/1) (A) so that the mirror surface is 120cm ± 5cm in front of the adjustment case
After the VAS 6190 or (VAS 6041 with VAS 6041/1) calibration fixture is in position, perform the following steps:
- Install the brake pedal depressor.
- Unplug video camera alignment sensors.
- Mount ACC video camera sensors to the VAS 6190 or (VAS 6041 with VAS 6041/1) fixture.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

The vehicle may be rolled rearward to obtain the distance. See instructions.

Place the portable cameras, if using targets, or the front sensors (DSP508) on the end of the fixture.

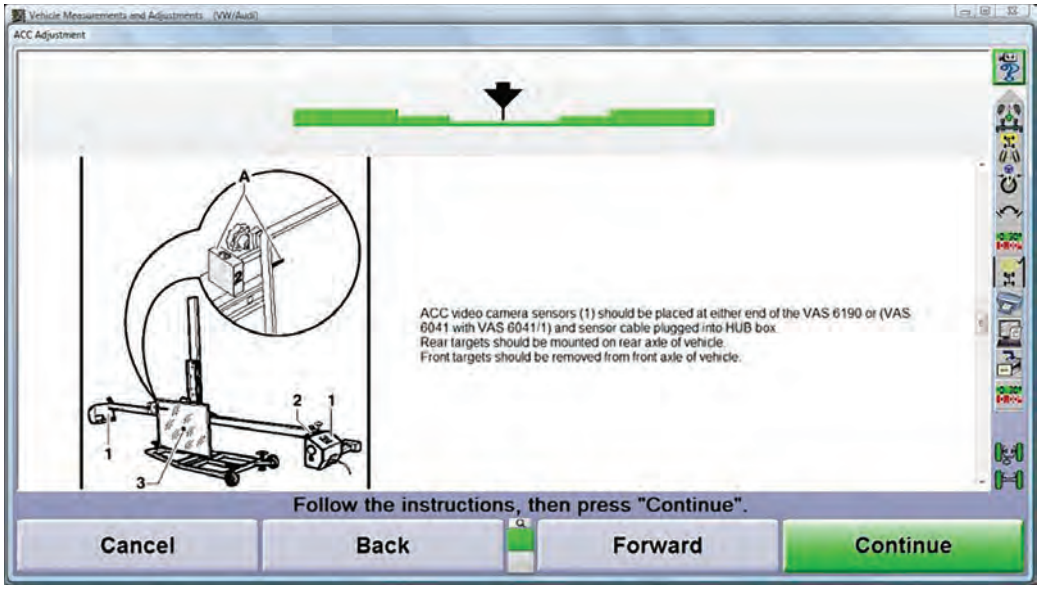

Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
After the VAS 6190 or (VAS 6041 with VAS 6041/1) calibration fixture is in position, perform the following steps:
- Install the brake pedal depressor.
- Unplug video camera alignment sensors.
- Mount ACC video camera sensors to the VAS 6190 or (VAS 6041 with VAS 6041/1) fixture.
- Level and lock ACC video camera sensors.
- Plug in ACC video camera sensors.
- Remove the front targets. Do not remove rear targets.
If the wheel alignment has not previously been performed, or the rear targets have been removed from the rear wheels, then mount the rear targets on the rear wheels of the vehicle and perform run-out compensation with the rear targets using either the rolling procedure or jacking up the rear axle.
If it was not possible to position VAS 6190 or (VAS 6041 with VAS 6041/1) fixture due to lack of space in front of the vehicle, then roll the vehicle rearwards in the alignment bay until the distance required between the radar sensor and the target on the radar calibration fixture can be achieved.
This will require the technician to:
- Verify that the vehicle can be rolled rearward without causing damage or jeopardize safe operation.
- Install wheel chocks to limit the rearward travel of the vehicle.
- Position the radar calibration fixture in the measurement bay in front of the vehicle.
- Remove the brake pedal depressor.
- Roll the vehicle rearward until the distance between the radar sensor and the target on the radar calibration fixture is at the required dimension.
- Level and lock the targets.
- Exit this procedure and compensate the rear targets using either the rolling procedure or jacking up the rear axle.
- Return to this procedure.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Turn the adjustment knob so position #2 is parallel to the mirror.

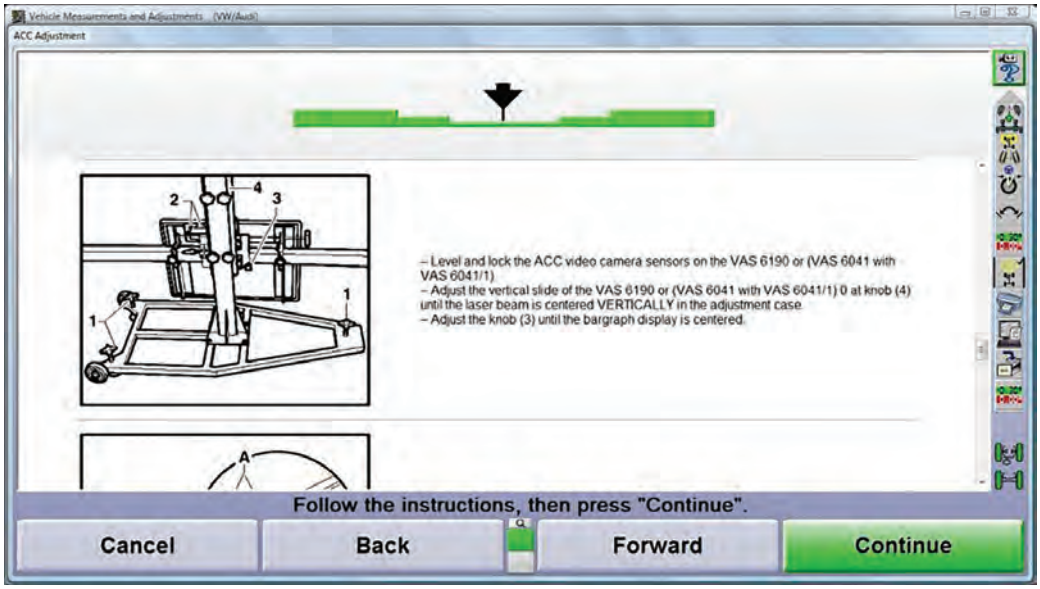


Move the fixture laterally until the laser beam is centered horizontally on the adjustment case.

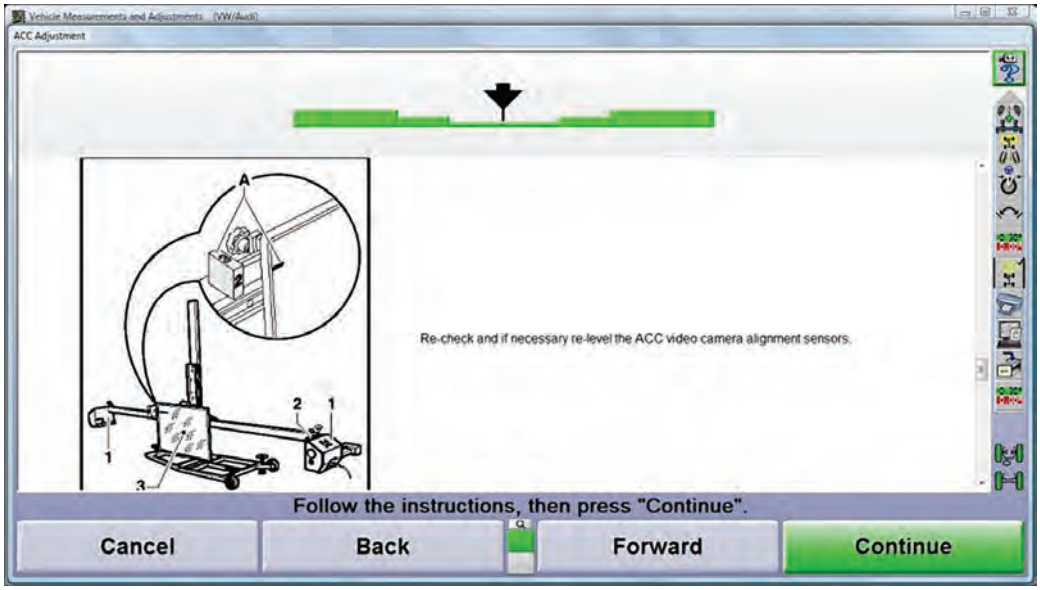
Front sensors or ACC video camera sensors are placed on the end of the fixture. If using ACC video cameras, remove them from targets and adapters. Level the camera/sensors.


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
ACC video camera sensors (1) should be placed at either end of the VAS 6190 or (VAS 6041 with VAS 6041/1) and sensor cable plugged into HUB box.
Rear targets should be mounted on rear axle of vehicle.
Front targets should be removed from front axle of vehicle.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

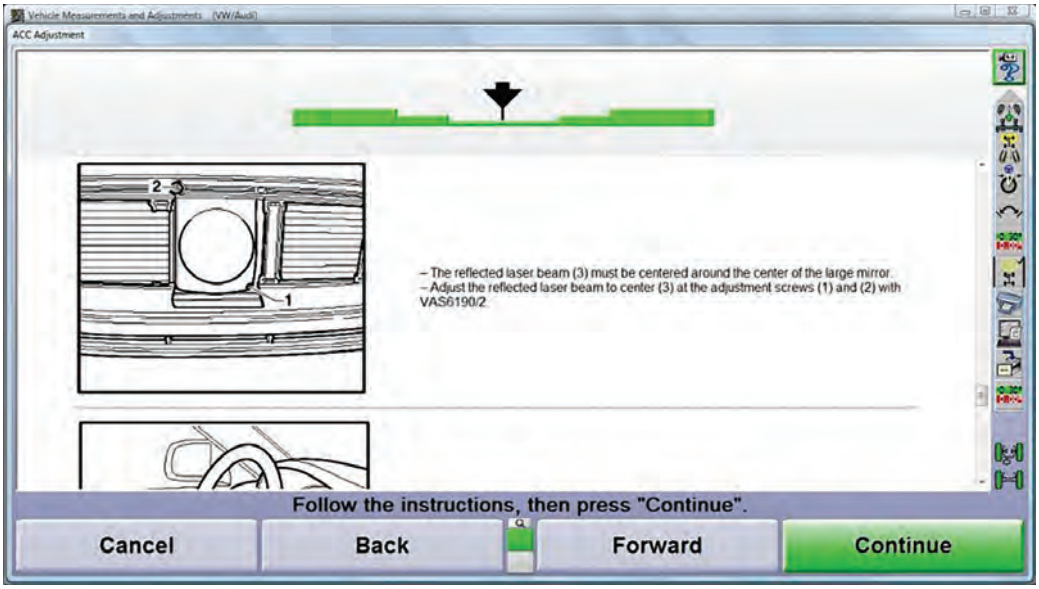
Adjust the vertical slide of the fixture to center the laser on the adapter case vertically, Adjust knob #3 until the arrow in the bar graph is centered.


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
– Level and lock the ACC video camera sensors on the VAS 6190 or (VAS 6041 with VAS 6041/1)
– Adjust the vertical slide of the VAS 6190 or (VAS 6041 with VAS 6041/1) 0 at knob (4) until the laser beam is centered VERTICALLY in the adjustment case.
– Adjust the knob (3) until the bargraph display is centered.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

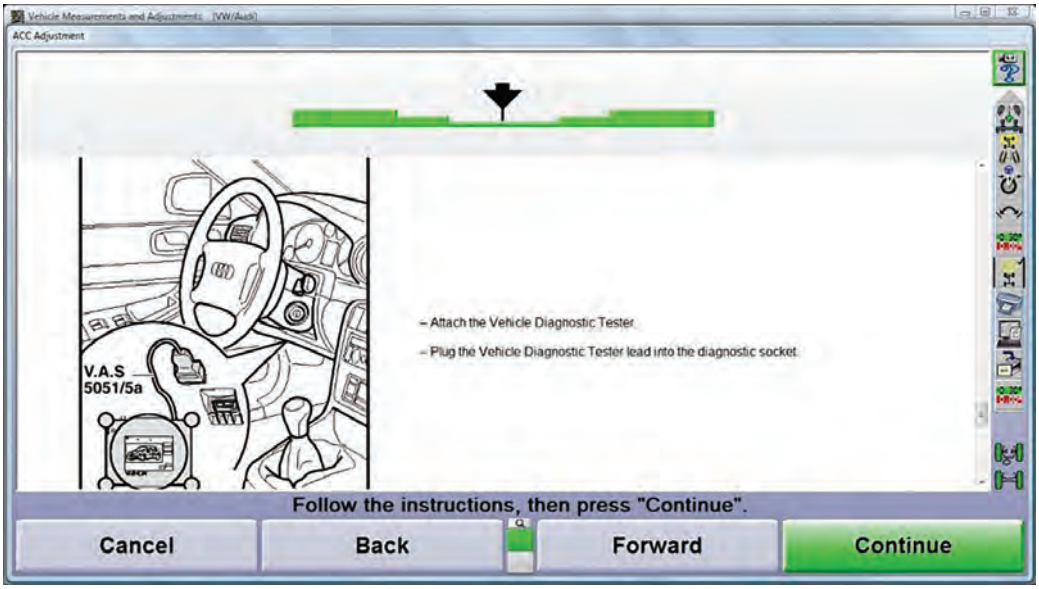
Check and adjust the level condition of the cameras/sensors on the fixture bar.



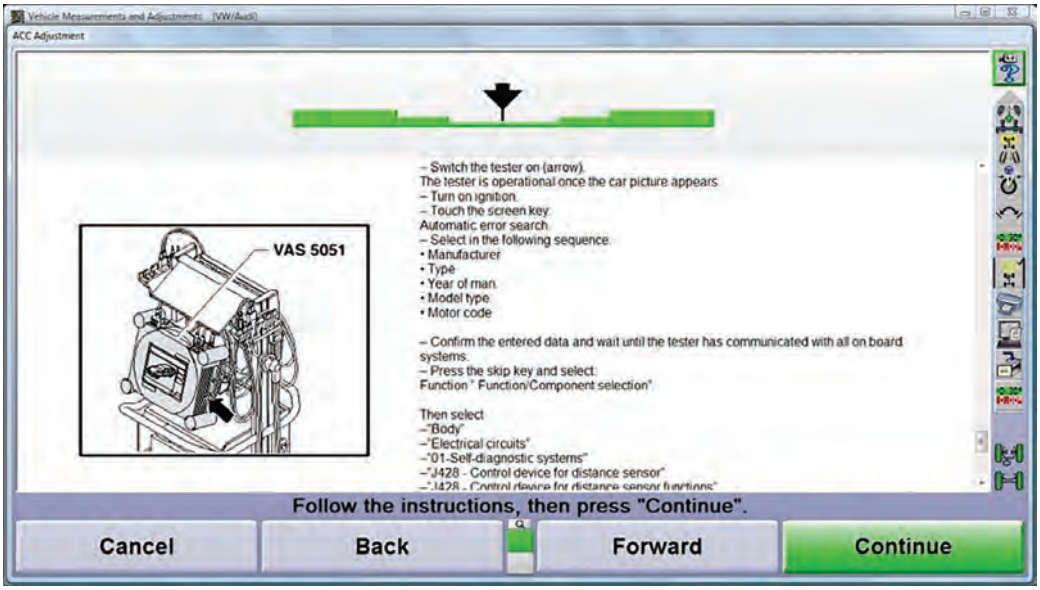
Adjust the reflected laser beam to center using adjustment screws on the ACC housing.


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
2
1
– The reflected laser beam (3) must be centered around the center of the large mirror.
– Adjust the reflected laser beam to center (3) at the adjustment screws (1) and (2) with VAS6190/2.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

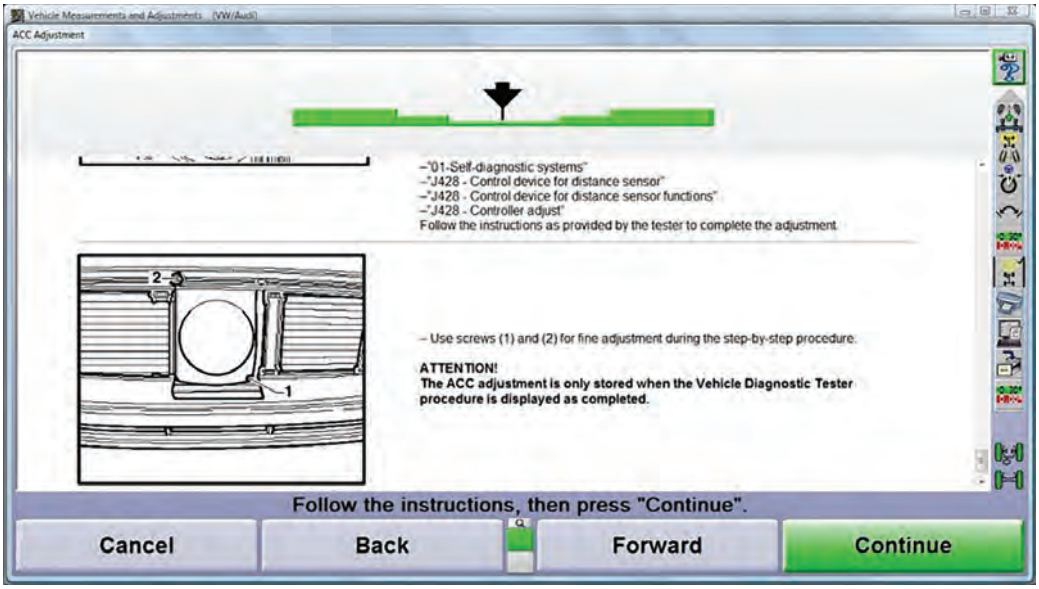
Attach the VAS Diagnostic tool.



Turn the diagnostic tester on and follow the instructions on the alignment screen.


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
VAS 5051
– Switch the tester on (arrow).
The tester is operational once the car picture appears.
– Turn on ignition.
– Touch the screen key.
Automatic error search.
– Select in the following sequence.
• Manufacturer
• Type
• Year of man.
• Model type
• Motor code
– Confirm the entered data and wait until the tester has communicated with all on board systems.
– Press the skip key and select:
Function " Function/Component selection"
Then select
–"Body"
–"Electrical circuits"
–"01-Self-diagnostic systems"
–"J428 - Control device for distance sensor"
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Perform fine adjustments when needed using adjustment screws on the ACC housing,


Vehicle Measurements and Adjustments (VW/Audi)
ACC Adjustment
–"01-Self-diagnostic systems"
–"J428 - Control device for distance sensor"
–"J428 - Control device for distance sensor functions"
–"J428 - Controller adjust"
Follow the instructions as provided by the tester to complete the adjustment.
2
1
– Use screws (1) and (2) for fine adjustment during the step-by-step procedure.
ATTENTION!
The ACC adjustment is only stored when the Vehicle Diagnostic Tester procedure is displayed as completed.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

The printout may indicate the adjustment of the ACC system.

Rear axle	Camber	left		-1°15'	+/-0°20'
		right			
		cross		0°00'	+/-0°20'
	Toe	left		0°12'	+/-0°04'
		right			
		total		0°24'	+/-0°08'
	Geometrical driving axis			0°00'	+/-0°10'
Front axle	Camber	left		-1°00'	+/-0°25'
		right			
		cross		0°00'	+/-0°30'
	Caster	left			
		right			
		cross		0°00'	
	SAI	left			
		right			
		cross		0°00'	
	Track differential angle	left		-1°36'	+/-0°30'
		right			
	Toe	left		0°08'	+/-0°04'
		right			
		total		0°16'	+/-0°08'
	Toe (Raised)	left		-0°05'	+/-0°06'
		right			
		cross		0°00'	+/-0°08'
	Setback			0°00'	
	Max steering lock left steer	left		-40°35'	+40°35' -0°00'
		right			+40°35' -0°00'
	Max steering lock right steer	left			+40°35' -0°00'
		right		-40°35'	+40°35' -0°00'

ACC was adjusted. An Alignment was not performed.

Appendix E

Night Vision Assist (SSP 970203)

The Night Vision Assist system uses a thermal imaging camera to detect heat-emitting objects, such as human beings and larger animals, in difficult light situations.

The illustration demonstrates the advantages of the Night Vision Assist system for drivers. Only part of the pedestrian crossing the road can be seen through the windshield. A quick glance at the Night Vision Assist display, however, shows the entire pedestrian, making them easier to see, and avoid.

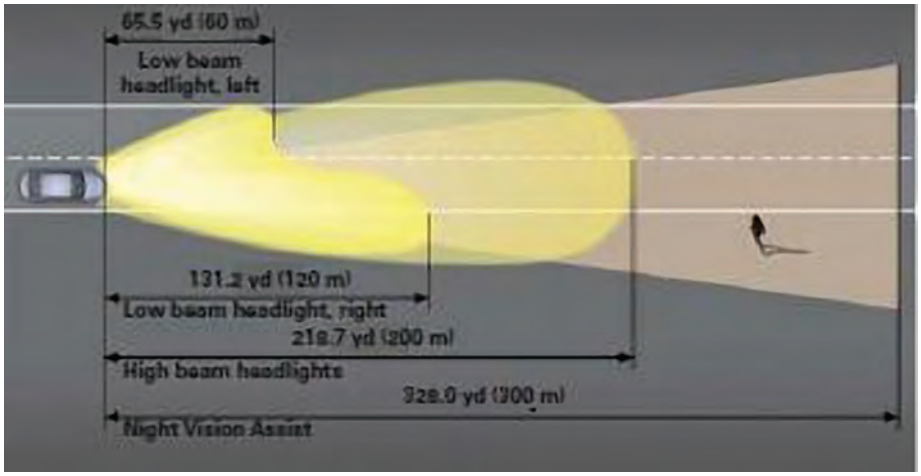
The thermal image is analyzed by the Night Vision Assist control module. From the images captured, the system predicts the next direction of movement of detected pedestrians or larger animals.

Actual vehicle speed and yaw rate are factored to predict the next movements of the vehicle. If a danger of collision is computed on the basis of these two predictions, an acoustic warning signal will be given so the driver can react to the situation.

However, Night Vision Assist does not itself intervene in road traffic situations.

When visibility is good, Night Vision Assist has a maximum range of approximately 328.0 yd (300 m). In bad weather, the range of the system is considerably shorter.

By comparison, asymmetrical low beam headlights have a good weather range of approximately 65.5 yd (60 m) on the side facing oncoming traffic and 131.2 yd (120 m) on the side facing the road edge. High beam headlights have a good weather range of about 218.7 yd (200 m), considerably less than that of Night Vision Assist.



Switching Night Vision Assist ON

There is a separate button on the rotary light switch module for activating Night Vision Assist to the ON position (see illustration below).Night Vision Assist can be switched ON at any time during daylight hours. In the dark, Night Vision Assist can only be switched ON if the rotary light switch is set to either the AUTO or DRIVING LIGHTS settings.

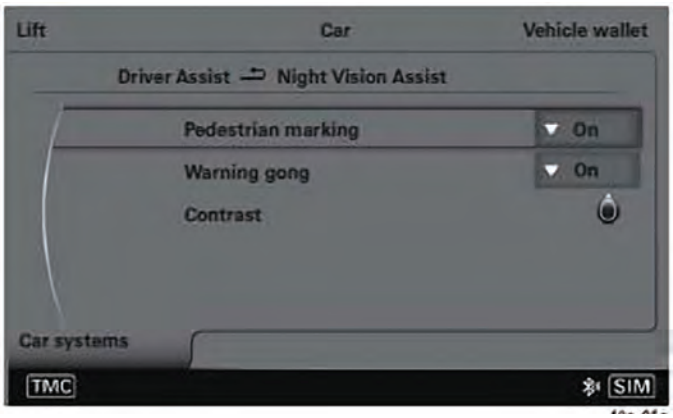
Indication of Deactivated Functions

If “Marking of detected pedestrians” and the acoustic warning “Warning gong” are deactivated in the MMI, this deactivation will be indicated continuously at the top right of the Night Vision Assist picture.

Adjustment Options on the MMI

Three different options for adjustment of Night Vision Assist are available to the customer through the MMI. To access the settings menu, follow these steps:

- Press the CAR function key
- Press the “CAR systems” control key
- Select menu option “Driver assist”
- Select “Night Vision Assist” system



Appendix E

Marking of Detected Pedestrians

If this option is activated, all detected pedestrians are marked yellow in the picture. If a warning is given, the color of the marking changes from yellow to red.

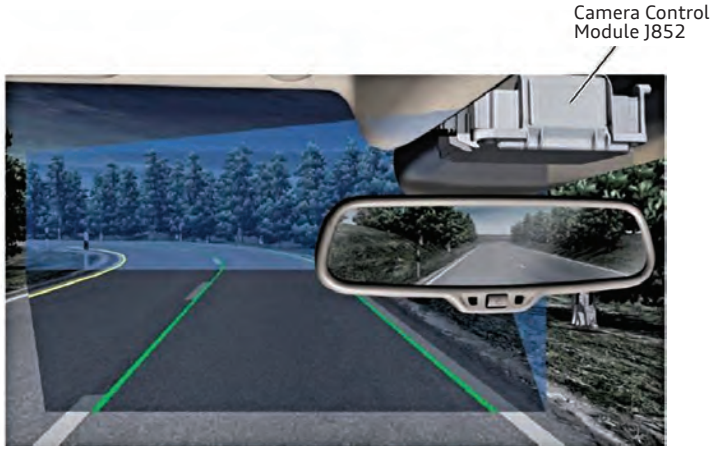
Warning Gong

If this option is activated, an acoustic signal is heard and the pedestrian marked red if there is imminent danger of a collision. This adjustment option is only available if the option “Marking of detected pedestrians” is activated.

Contrast

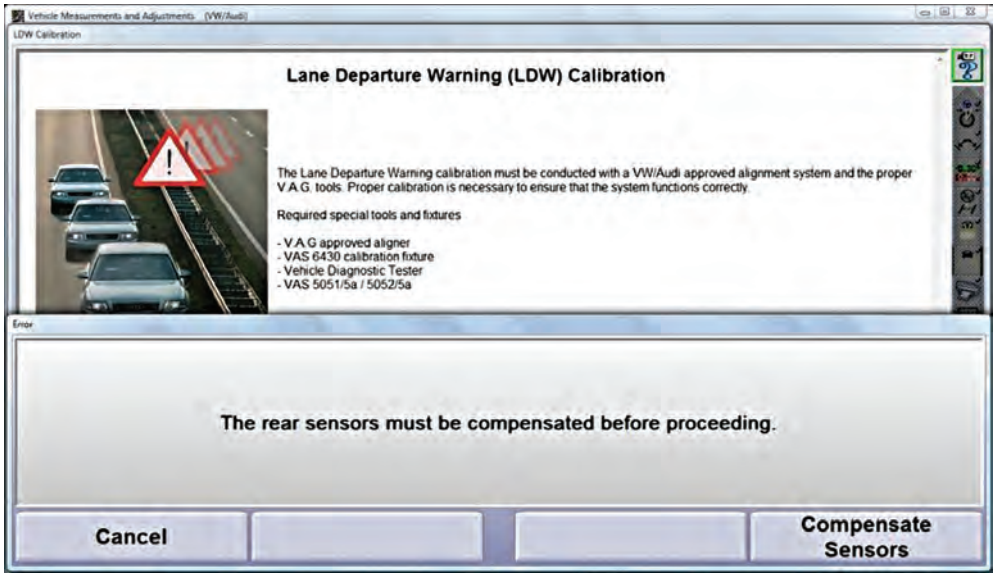
The contrast level of the thermal image is adjustable on a scale from -9 to +9.This adjustment option is only available if the thermal image is currently being shown on the Driver Information System display. If different information is displayed, the menu option “Contrast” will be grayed out.

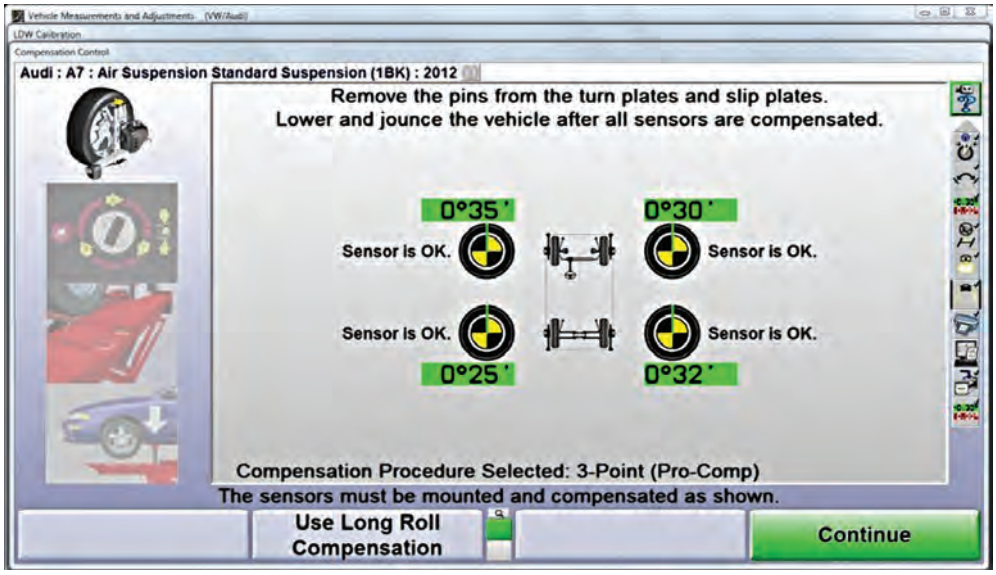
Note: The settings described here are assigned to the ignition key in use when the ignition is turned OFF and are stored in the Night Vision Assist control module. They are restored the next time the ignition key is used.
J852 is installed as high as possible in the center of the windshield (over the base of the rear view mirror) to provide the fullest possible coverage of the vehicle perimeter. The control module is installed in the same position as the Audi Lane Assist control module in other models.



Calibrating Night Vision using WinAlign® software

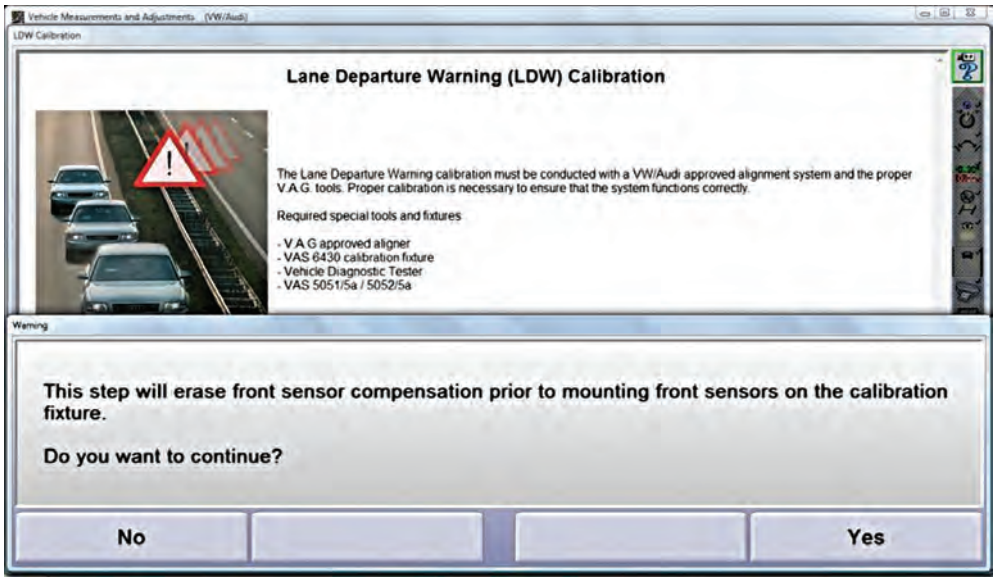
Compensate the rear sensors as required.


Lane Departure Warning (LDW) Calibration
The Lane Departure Warning calibration must be conducted with a VW/Audi approved alignment system and the proper V.A.G. tools. Proper calibration is necessary to ensure that the system functions correctly.
Required special tools and fixtures
- V.A.G approved aligner
- VAS 6430 calibration fixture
- Vehicle Diagnostic Tester
- VAS 5051/5a / 5052/5a
Error
The rear sensors must be compensated before proceeding.
Cancel
Compensate Sensors


Audi : A7 : Air Suspension Standard Suspension (1BK) : 2012
Remove the pins from the turn plates and slip plates.
Lower and jounce the vehicle after all sensors are compensated.
0°35'
0°30'
Sensor is OK.
Sensor is OK.
Sensor is OK.
Sensor is OK.
0°25'
0°32'
Compensation Procedure Selected: 3-Point (Pro-Comp)
The sensors must be mounted and compensated as shown.
Use Long Roll Compensation
Continue

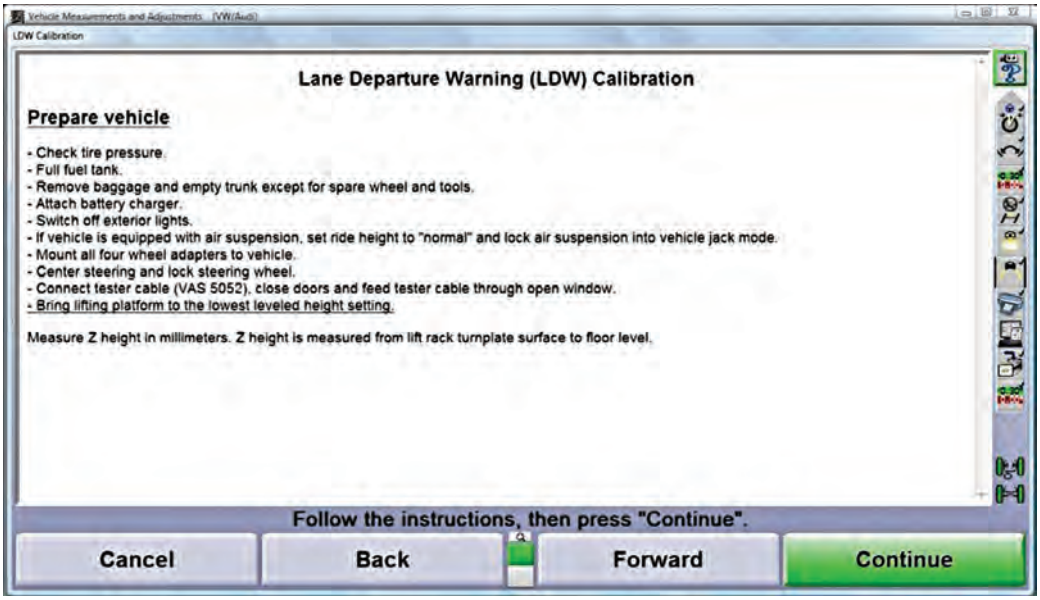
This screen may appear if rolling compensation was performed.

Select K-4 “Yes” to continue

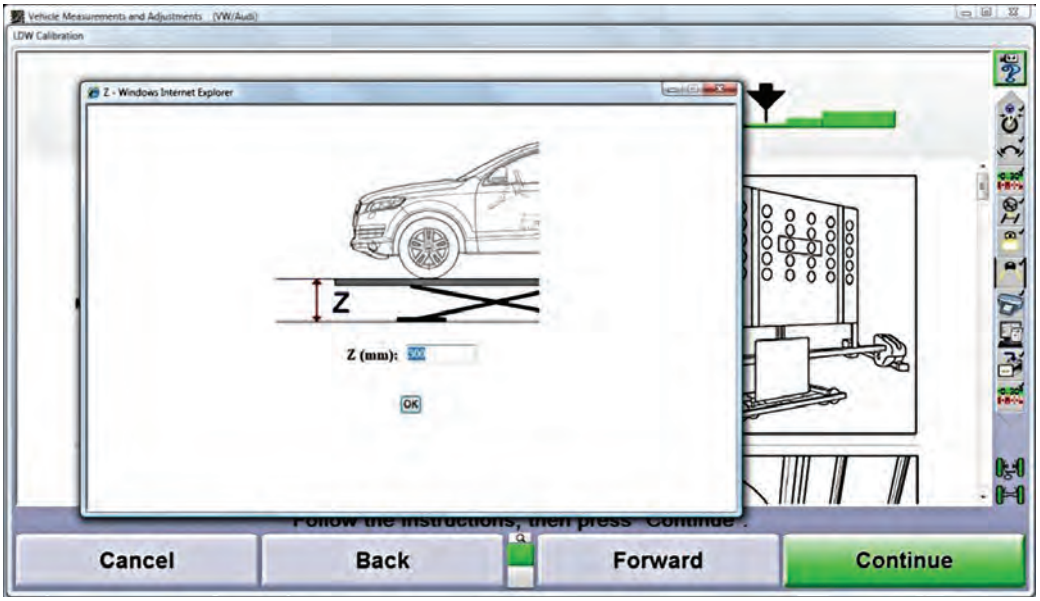

Lane Departure Warning (LDW) Calibration
The Lane Departure Warning calibration must be conducted with a VW/Audi approved alignment system and the proper V.A.G. tools. Proper calibration is necessary to ensure that the system functions correctly.
Required special tools and fixtures
- V.A.G approved aligner
- VAS 6430 calibration fixture
- Vehicle Diagnostic Tester
- VAS 5051/5a / 5052/5a
Warning
This step will erase front sensor compensation prior to mounting front sensors on the calibration fixture.
Do you want to continue?
No
Yes

Appendix E

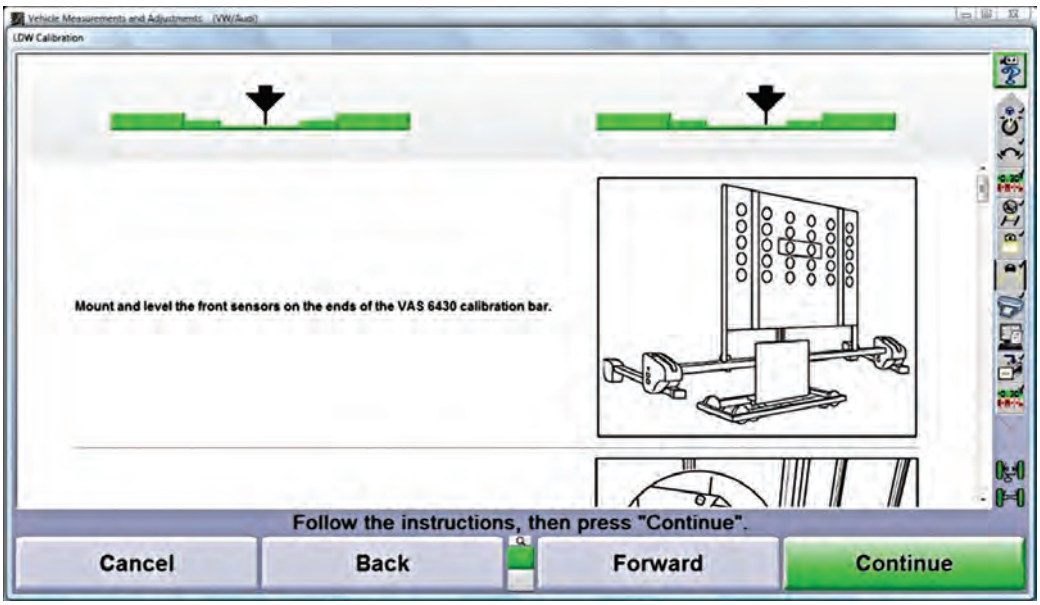
Prepare the vehicle following the instructions on the display. Each step is critical to the success of this procedure, leaving the lift to high will make it impossible to complete the procedure.


Vehicle Measurements and Adjustments (VW/Audi)
LDW Calibration
Lane Departure Warning (LDW) Calibration
Prepare vehicle
- Check tire pressure.
- Full fuel tank.
- Remove baggage and empty trunk except for spare wheel and tools.
- Attach battery charger.
- Switch off exterior lights.
- If vehicle is equipped with air suspension, set ride height to "normal" and lock air suspension into vehicle jack mode.
- Mount all four wheel adapters to vehicle.
- Center steering and lock steering wheel.
- Connect tester cable (VAS 5052), close doors and feed tester cable through open window.
- Bring lifting platform to the lowest leveled height setting.
Measure Z height in millimeters. Z height is measured from lift rack turnplate surface to floor level.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

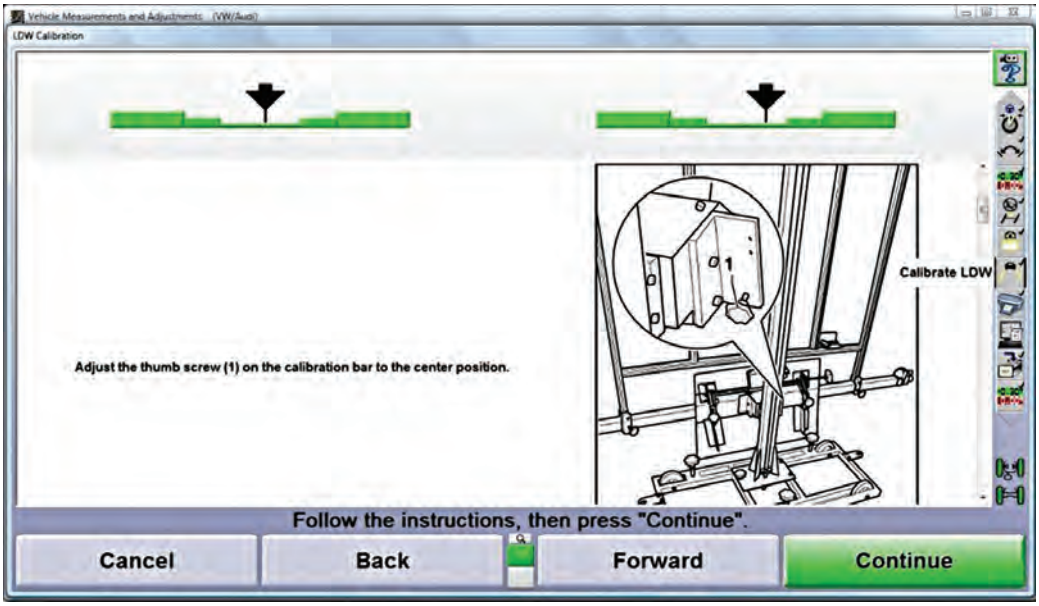
Enter the “Z” height (floor to top of turnplate) and select K-4 “Continue”.



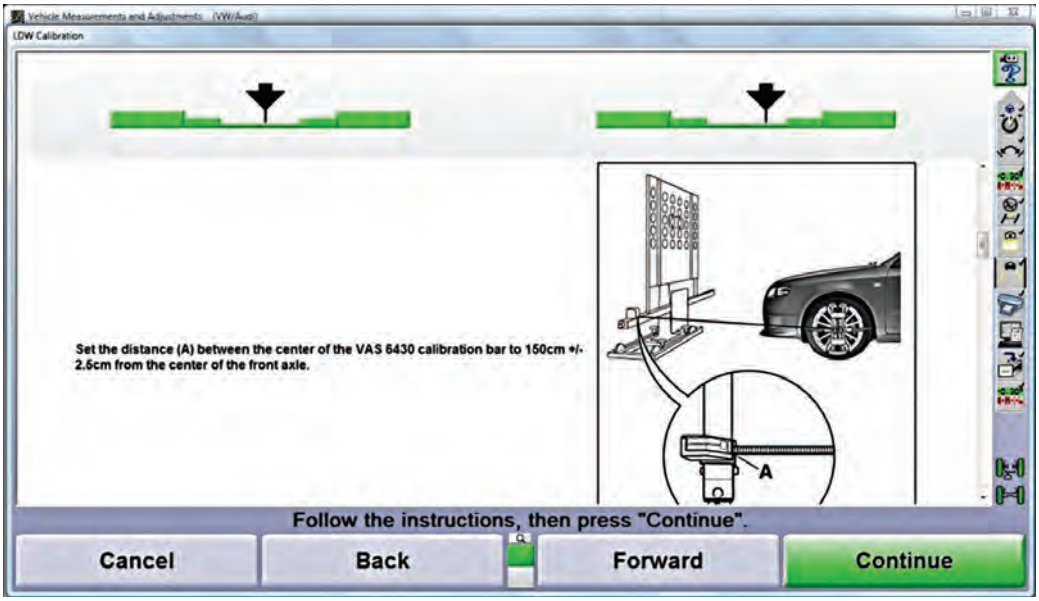
Mount and level sensors on the ends of the calibration bar. If using cameras, mount the remote cameras on the end of the fixture and follow instructions.


Vehicle Measurements and Adjustments (VW/Audi)
LDW Calibration
Mount and level the front sensors on the ends of the VAS 6430 calibration bar.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

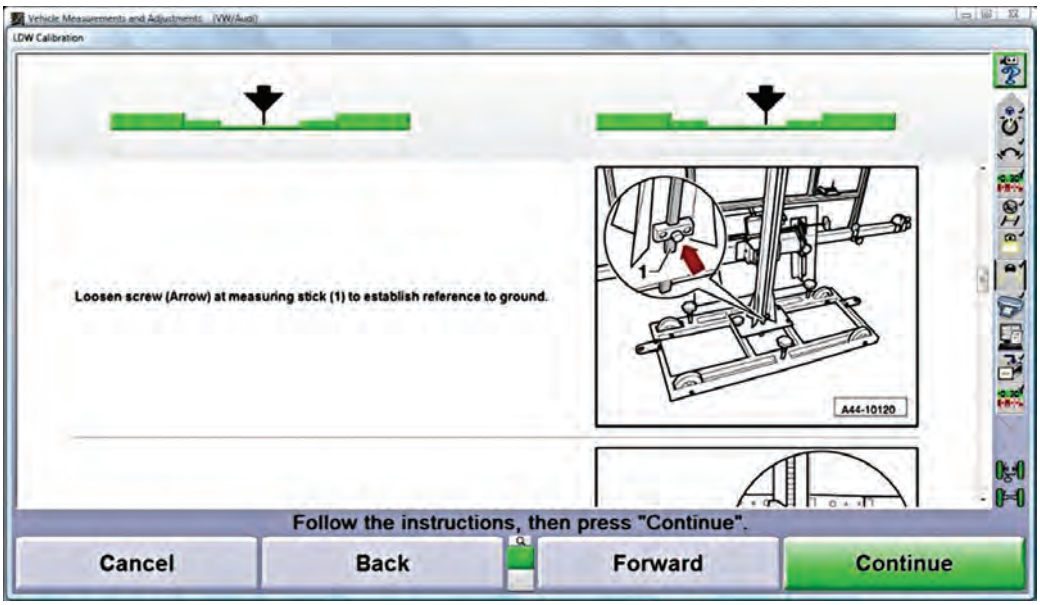
Adjust the thumb screws to the center position.



Set the distance between center of cal bar and center of front axle to 150cm ± 2.5cm.

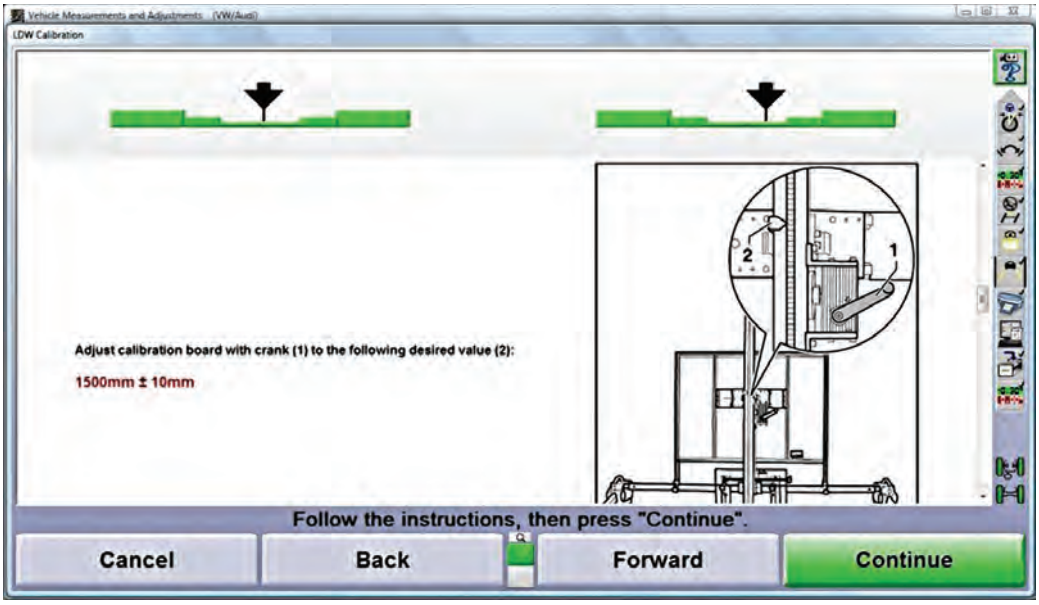

Vehicle Measurements and Adjustments (VW/Audi)
LDW Calibration
Set the distance (A) between the center of the VAS 6430 calibration bar to 150cm +/- 2.5cm from the center of the front axle.
A
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Loosen screw on measuring stick to establish ground reference.

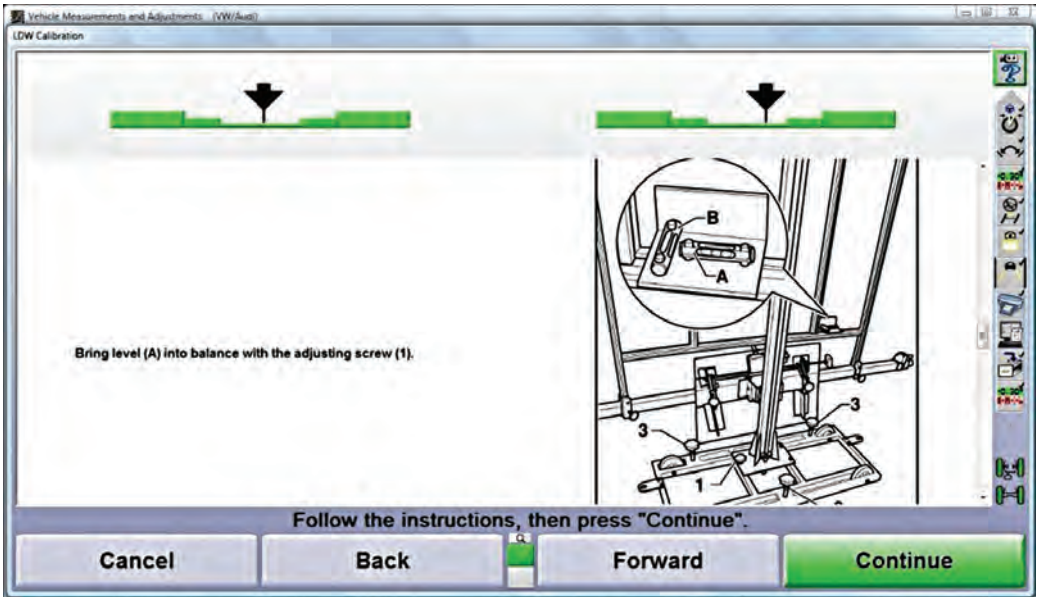


Appendix E

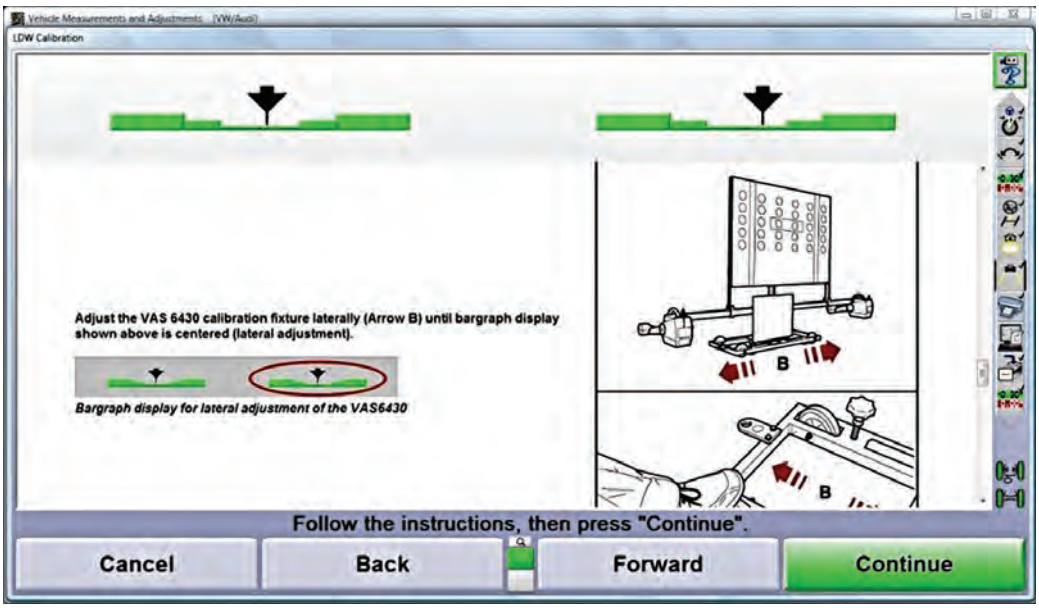
Adjust calibration board to specified height.



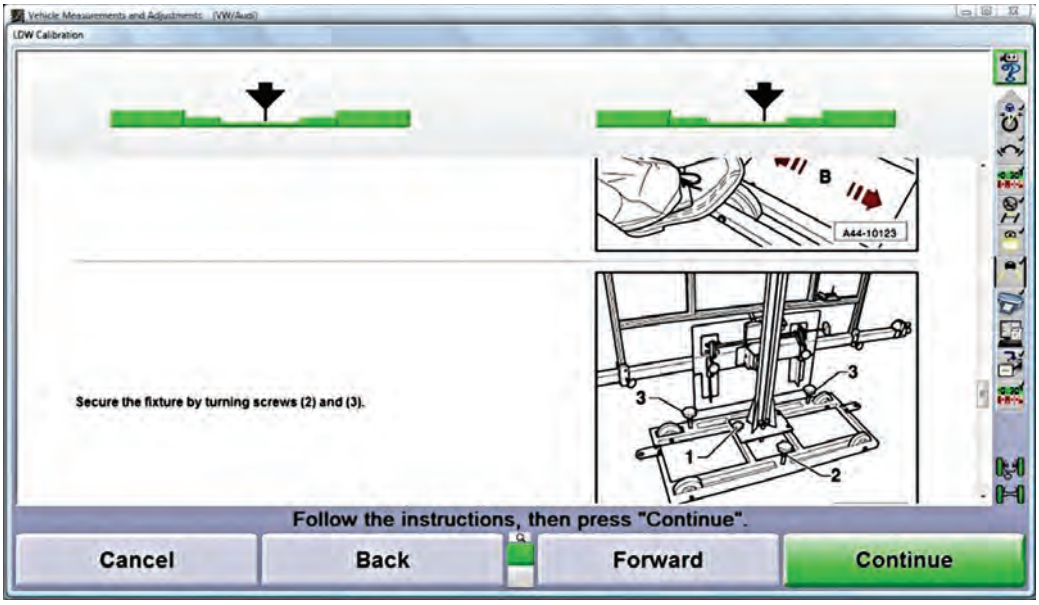
Level fixture using levels A and B.



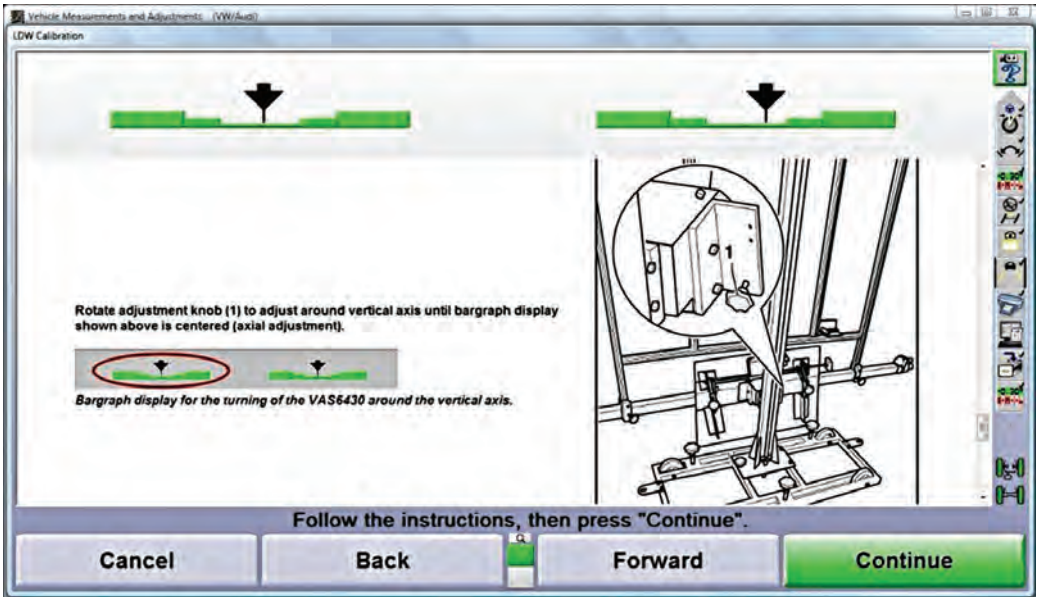
Adjust fixture laterally.


Vehicle Measurements and Adjustments (VW/Audi)
LDW Calibration
Adjust the VAS 6430 calibration fixture laterally (Arrow B) until bargraph display shown above is centered (lateral adjustment).
Bargraph display for lateral adjustment of the VAS6430
B
B
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

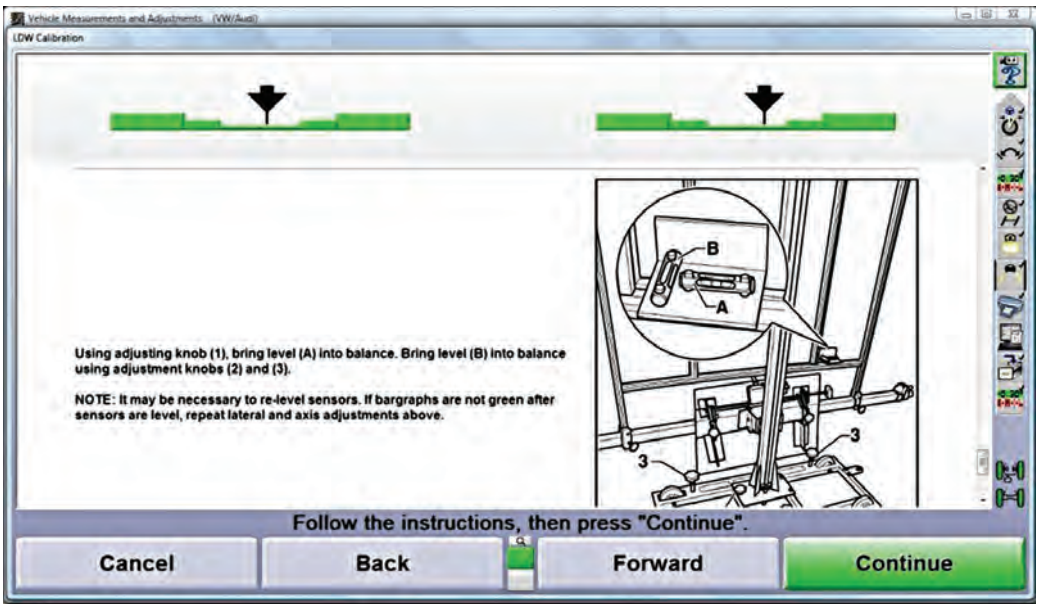
Secure fixture using floor contact screws (2) and (3).



Adjust the fixture vertically.

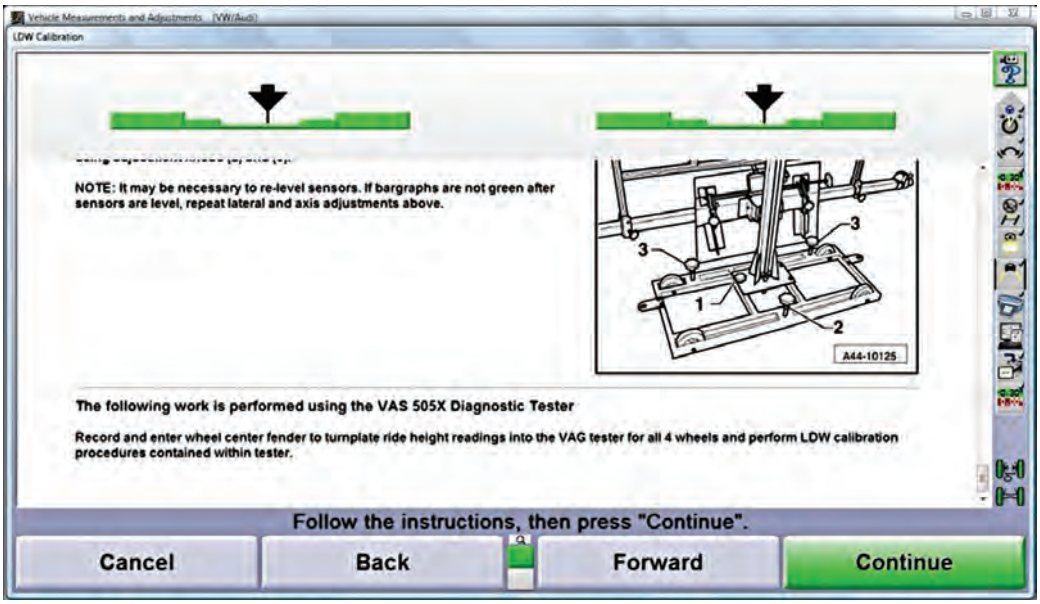

Vehicle Measurements and Adjustments (VW/Audi)
LDW Calibration
Rotate adjustment knob (1) to adjust around vertical axis until bargraph display shown above is centered (axial adjustment).
Bargraph display for the turning of the VAS6430 around the vertical axis.
1
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

Level fixture into a level condition using screws (1), (2) and (3), Follow all screen instructions.

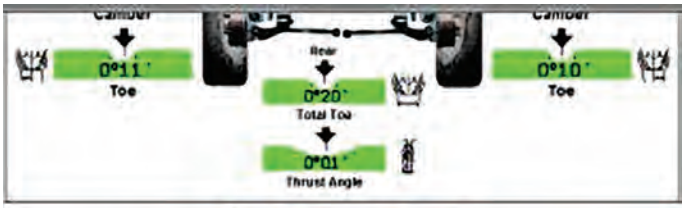

Vehicle Measurements and Adjustments (VW/Audi)
LDW Calibration
Using adjusting knob (1), bring level (A) into balance. Bring level (B) into balance using adjustment knobs (2) and (3).
NOTE: It may be necessary to re-level sensors. If bargraphs are not green after sensors are level, repeat lateral and axis adjustments above.
B
A
3
3
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

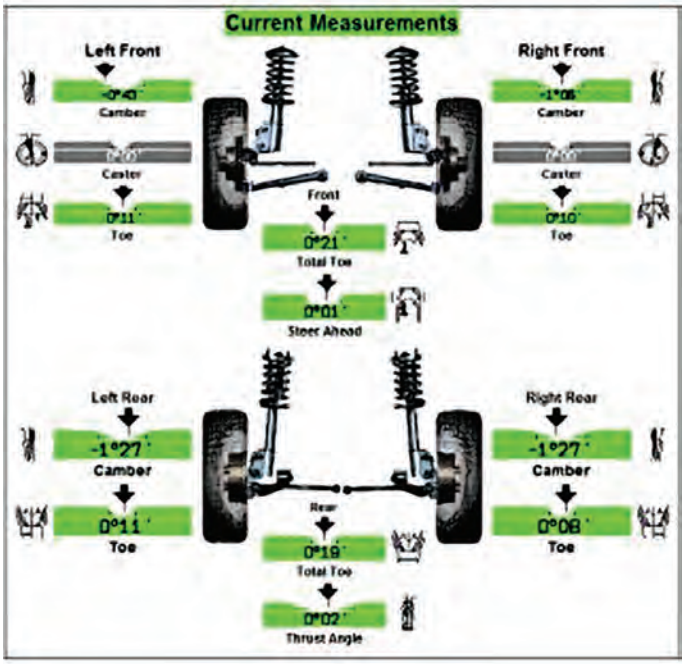
Appendix E

The fixture is now ready for calibrating the LDW. Use the VAS 505X Diagnostic Tester to complete the calibration process.


LDW Calibration
NOTE: It may be necessary to re-level sensors. If bargraphs are not green after sensors are level, repeat lateral and axis adjustments above.
3
3
1
2
A44-10125
The following work is performed using the VAS 505X Diagnostic Tester
Record and enter wheel center fender to turnplate ride height readings into the VAG tester for all 4 wheels and perform LDW calibration procedures contained within tester.
Follow the instructions, then press "Continue".
Cancel
Back
Forward
Continue

The print “before and after” printout indicates which procedures were performed.

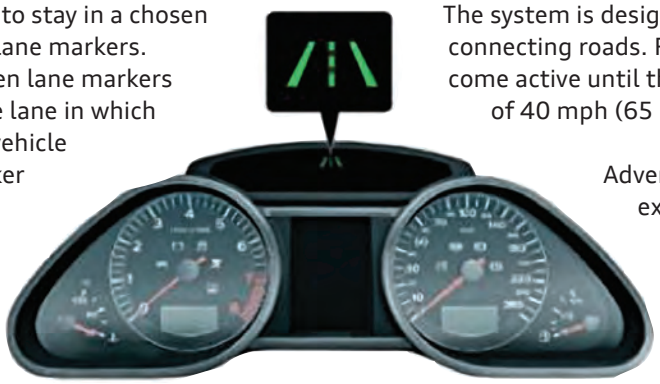




- Night Vision System was adjusted.
- Lane Departure Warning was not calibrated.
- LDW was adjusted.
- Dynamic Steering was calibrated.
- An Alignment was performed.

Audi Lane Assist SSP 911703

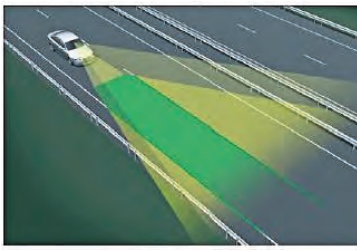
Audi Lane Assist helps the driver to stay in a chosen lane. A camera is used to detect lane markers. Audi Lane Assist is “on alert” when lane markers are detected on either side of the lane in which the vehicle is driving. When the vehicle approaches a detected lane marker and is about to depart from the lane, Audi Lane Assist alerts the driver by making the steering wheel vibrate. If Audi Lane Assist is “on alert” and the driver indicates a desire to change lanes by activating a turn signal, no warning is given. The system assumes the lane change is deliberate.



The system is designed for use on freeways and connecting roads. For this reason, it does not become active until the vehicle is traveling at a speed of 40 mph (65 kph) or higher.

Adverse ambient conditions (for example dirty or snow covered road surfaces, narrow lanes, or ambiguous lane markers) may result in the system being temporarily unavailable. A display in the instrument cluster informs the driver of current system status.

Other displays are used when Lane Assist is coupled with Adaptive Cruise Control, Refer to SSP 911703 for more information.



If the warning lamp in the instrument cluster is green, the system is active and "on alert."

If the warning lamp in the instrument cluster is yellow, the system is active but NOT "on alert."

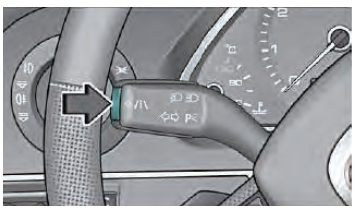
In this condition, Audi Lane Assist does NOT assist the driver and gives no alert warnings. Possible reasons for deactivation are given on the following page.

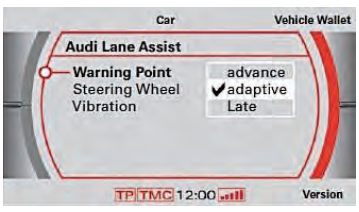
If the Audi Lane Assist warning lamp is not lit, then the **system is inactive.**
To activate the system, push the Audi Lane Assist button on the turn signal indicator stalk.

Setting the Warning Point

The driver can decide whether an alert warning is to be given before the vehicle inadvertently leaves the lane or not until a wheel makes contact with the lane marker.

There are three possible warning point settings on the MMI.





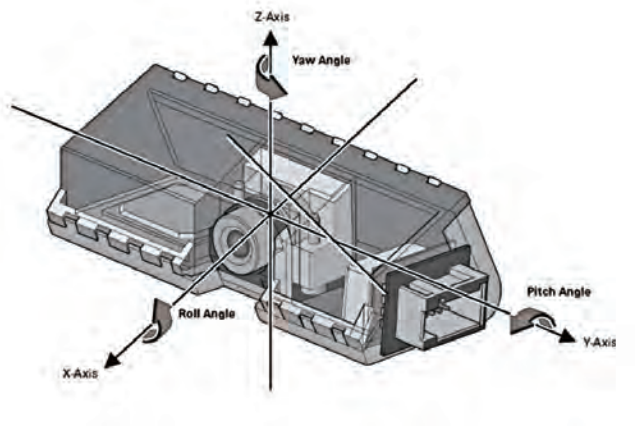
Appendix E

Calibration

The calibration procedure involves determining the actual orientation angle of the camera on the vehicle. Deviations from the nominal installed position can occur due to component tolerances of the holder or windshield or because of manufacturing tolerances.

The system must be calibrated in order to compensate for these deviations. The calibration procedure involves determining the three orientation angles of the camera in relation to the vehicle's direction of travel as well as the height of the camera to the tire contact area.

The calibration is made electronically and requires no mechanical adjustments.



New special tools are required for calibrating Audi Lane Assist. They belong to tool family VAS 6430. This device can be used for calibrating both Audi Lane Assist and Active Cruise Control ACC.

Special tool VAS 6430 is a complete set and includes the following separately available components:

- VAS6430/1 Calibration Device Basic Set
- VAS6430/2 ACC Laser Unit (VW)
- VAS6430/3 ACC Reflector Mirror (Audi)
- VAS6430/4 Audi Lane Assist Calibration Board

Required calibration Tools:

- Diagnostic Tester VAS 5051B or VAS5052
- Approved Wheel Alignment Computer and lift
- Calibration Tools VAS 6430/1 and VAS 6430/4

VAS 6430/1 Calibration Device (Basic set)
398_017

VAS 6430/4 Audi Lane Assist Calibration Board
398_018

Reasons to Calibrate the Lane Assist System

- The Fault Memory Contains the Entry "No or Incorrect Basic Settings/Adaption."
- Directional Stabilization Assistance Control Module J759 has been Replaced
- The Windshield has been Replaced or Removed.
- Rear Axle Toe has been adjusted.
- Modifications affecting body height have been made to the vehicle suspension system.
- The Level Sensors on Vehicles with Damping Control or Air Suspension have been Re-adapted.

Calibration Procedure Overview

1. The "Calibration Audi Lane Assist" Program is started on the Wheel Alignment Computer.
2. Sensors are mounted to the rear wheels and compensated.
3. Cameras or front sensors are mounted to the ends of the VAS6430/1 fixture.
4. The VAS6430/1 and VAS6430/4 are aligned with the vehicle's thrust angle
5. The calibration program is started on the Vehicle Diagnostic Tool.
6. Body Height is measured front and rear wheel arches and entered into the calibration program software.
7. Calibration is performed by the Vehicle Diagnostic Tool.

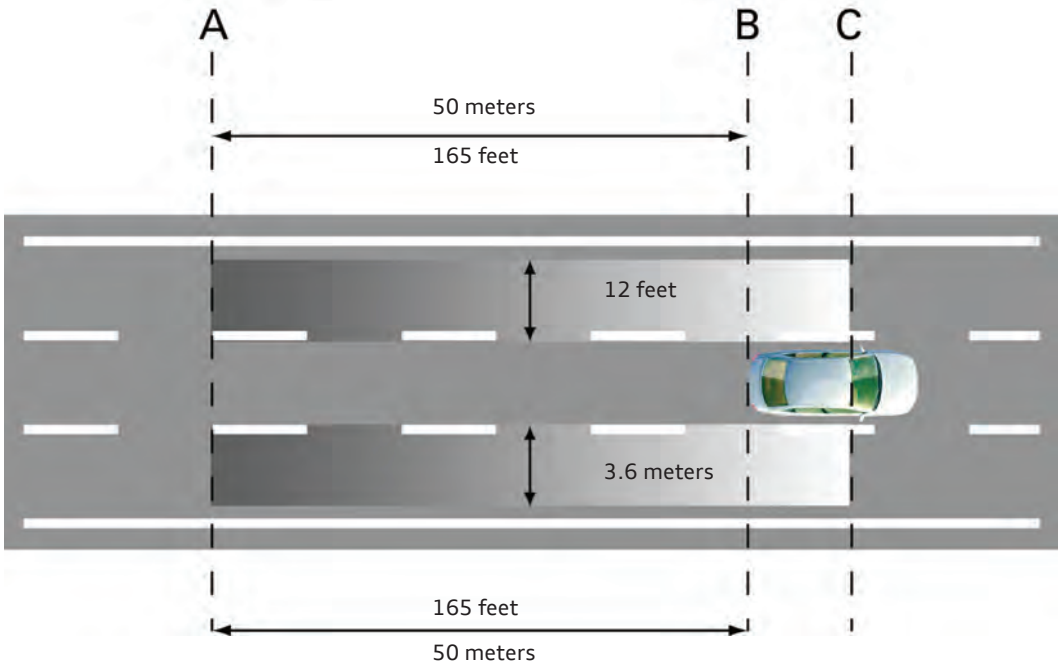
Post Alignment Calibrations not requiring Alignment Measurements

Lane Change Assistance (LCA) SSP 996603

The task of the Lane Change Assistance System is to monitor the areas to the rear and to the sides of the vehicle with the aid of radar sensors and to help the driver during a lane change. The monitored area covers also what is known as the “blind spot.” The driver side and the passenger side are both monitored. A separate radar sensor is provided for each side.

If the Lane Change Assistance System (LCA) detects a critical situation which could result in an accident during a lane change, the system informs and warns the driver.

The driver is informed by the activation of the warning lights in the appropriate exterior rear-view mirror, and is warned by the warning lights flashing brightly.



Appendix F

Special Tool for System Calibration

Special tools have been developed for calibrating the radar sensors.

- Calibration Board with a Doppler Generator VAS 6350
- Wheel Center Recorders VAS 6350/1
- Distance Measuring Equipment VAS 6350/2 with laser measurement technology.

The calibration board is used to calibrate both the radar sensors for the Lane Change Assistance System and the Rear View Camera System.

The first step is the correct positioning of the calibration board, which is described precisely in the Calibration Guide.

1. The calibration board is aligned at a specified distance of the two rear wheels.

    a. To do this, the wheel center recorders, also referred to as “paddles”, are pushed onto the wheel nuts with a special installer. Gravity aligns the paddles perpendicular to the ground.

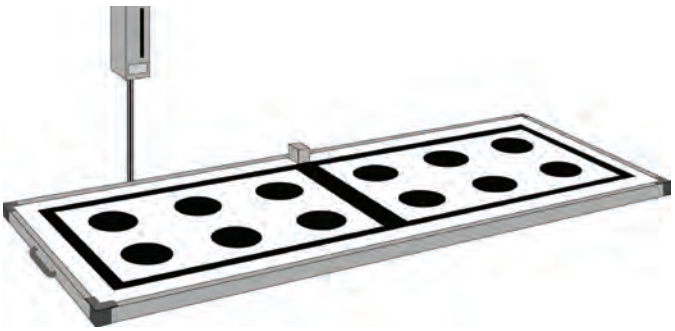
    b. The calibration board is now adjusted on both sides to the specified distance using an electronic distance gauge.

2. Using a line laser mounted centrally on the calibration board, the calibration board is aligned centrally to the vehicle longitudinal axis without changing the distance that has already been set.

    a. The laser creates a vertical line on the rear of the vehicle which, when it is correctly aligned, divides the vehicle into two halves,

After correct alignment, the calibration process can be started using the Scan Tool. The rest of the procedure is completely automatic.

The black circles on the calibration board are needed only to calibrate the Rear View Camera System. The “Doppler generator” is used to calibrate the radar sensors. It simulates a moving object by means of a rotating fan wheel whose specified position is known to the control module. From the difference between the actual position and the specified position, the control module can learn the corrective values to use to correct the measured positions from this point on.



Optical Parking System (OPS) SSP 996603

The Optical Parking System (OPS) is an innovative evolution of the previous parking aid systems from Audi. The 4-channel system (parking aid rear only) and the 8-channel system (parking aid front and rear) are already familiar. With these systems, the driver receives feedback through an acoustic signal identifying the distance between his or her vehicle and an obstacle.

The new Optical Parking System (OPS) is used with the 8-channel system. In addition to the existing acoustic sensor analysis, it provides the customer with an image in the MMI display which shows schematically the current distance of each individual parking aid sensor to an obstacle. Additional hardware is not needed for this expanded function.

The Optical Parking System can be ordered with or without the rear view camera.

A major benefit for drivers compared with the purely acoustic system is that they can now determine visually at what point their vehicle is approaching an obstacle. With the purely acoustic solution, the only distinction that can be made from the signal frequency is whether an obstacle was detected by the front 4 parking aid sensors or by the rear 4 sensors.

The Parking Aid Control Module J446 is installed at the right rear, below the load floor. It can be addressed with the Scan Tool under the Address Word 76.

Fifth generation parking aid sensors are used for the first time in the Audi Q7.

Their dimensions are considerably smaller than those of the fourth generation sensors.

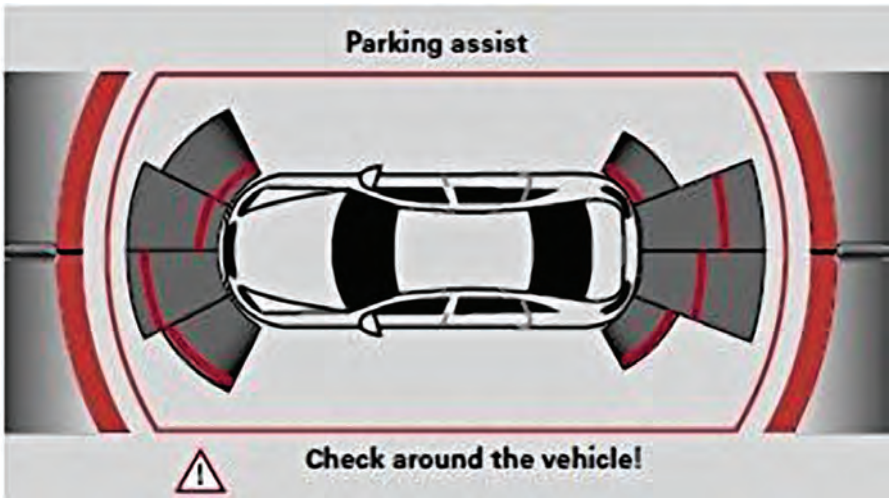
The solid plastic housing which surrounded the vibrating mass of the fourth generation sensor has been eliminated in the new sensor generation.

The Optical Parking System (OPS), like the previous 8-channel systems, monitors the area around the vehicle with 4 parking aid sensors integrated into the front bumper and 4 in the rear bumper. The acoustic message is given by one warning buzzer in the front area and one in the rear area of the vehicle. The visual display is in the MMI screen. There is acoustic and visual feedback to the driver only when the Parking Aid System is active. The system is automatically activated when the reverse gear is engaged.

When parking forwards or driving forwards towards an obstacle, the Parking Aid System must be activated manually by pressing the Parking Aid Button.

An activated Parking Aid System is deactivated:

- when the speed exceeds about 9.3 mph (15 km/h) (forwards)
- by switching the ignition off
- by pressing the Parking Aid Button



Appendix F

Diagnosis

The Address Word 76 is assigned to the Parking Aid Control Module in the Scan Tool.

The following variables can be read in the Measuring Value Blocks:

- Distance of the individual rear sensors to an obstacle
- Distance of the individual front sensors to an obstacle
- Minimum distance of the 4 rear sensors
- Minimum distance of the 4 front sensors
- Vehicle speed
- Supply voltage for the parking aid sensors
- Reverse gear engaged Yes/No
- Trailer attached Yes/No
- Function button actuation
- Rear acoustic warning volume and frequency setting
- Front acoustic warning volume and frequency setting
- Decay time for the individual rear sensors
- Decay time for the individual front sensors
- Currently valid vehicle key number
- Settings saved for the current vehicle key

The following properties are encoded in the module:

- Vehicle version (Sedan, Avant, Coupe
- USA or Rest of the World
- Type of transmission installed (manual/automatic)
- Rear view camera installation in vehicle
- Trailer hitch installation in vehicle
- Optical Parking System (OPS) or pure 8-channel acoustic parking aid

The following variables can be configured in the adaptation channels:

- Acknowledgment tone when the Parking Aid System is activated on/off
- Reset of volume and frequency to factory settings

The following components can be activated in the Diagnostic Test Mode:

- Rear Parking Aid Warning Buzzer H15
- Front Parking Aid Warning Buzzer H22
- Parking Aid Indicator Lamp K136

Note
Please always consult the electronic repair information for diagnostic information on the system.

Rear View Camera

The Audi Rear View Camera provides the driver with an improved vision toward the rear by scanning the area to the rear of the vehicle and displaying it on the MMI screen. This greatly simplifies for the driver the tasks of backing-up on a street or while parking.

It is possible to drive up much closer to obstacles with the rear view camera. The driver can keep looking forward most of the time and does not have to keep his head turned constantly. Static and dynamic assistance lines are added to the video image to make it even simpler to backup into a parking space.

The Rear View Camera can be ordered as an individual parking aid system, along with the acoustic rear parking aid, or with the Optical Parking System (OPS).

The ordering options vary considerably according to the particular market.

The Rear View Camera System Control Module is at the right rear of the vehicle, close to the wheel housing.

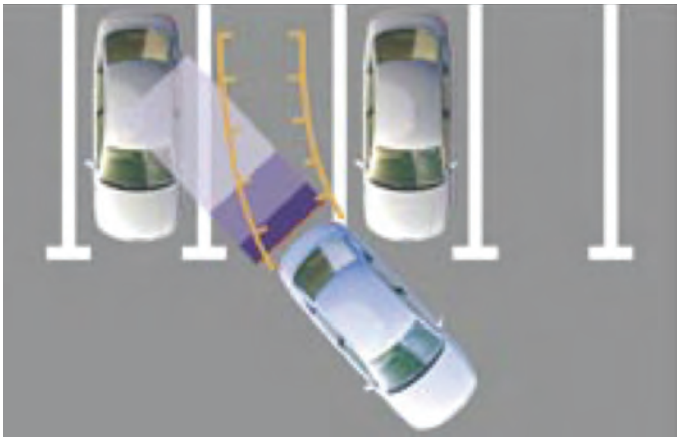
The image is transmitted from the Rear View Camera to the control module over a shielded line.

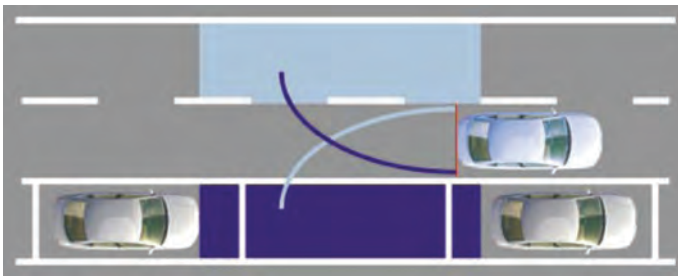
The complete video signal is transmitted over this line with color, brightness, blackout and synchronization information.

There are two different parking modes with the Audi Rear View Camera, the “perpendicular parking” mode and the “parallel parking” mode. Depending on the parking situation, the customer can choose one of the two modes. The “perpendicular parking” mode is set as the default mode. To change the mode that is currently active, the “Mode” soft key must be pressed in the MMI operating area. If the vehicle has the Optical Parking System (OPS) as well, it is possible to switch to the OPS graphic through the “Graphic” soft key.

Components:

- Steering Angle Sensor G85
- Parking Aid Control Module J4468
- Towing recognition control module J345
- Comfort System Central Control Module J393
- Access / Start Control Module J518
- Front Information Display Control Head Control Module J523
- Vehicle Electrical System Control Module J519
- ABS Control Module J104
- Data Bus On Board Diagnostic Interface J533





Appendix F

Diagnosis

The Rear View Camera System Control Module is assigned the Address Word 6C in the Scan Tool.

The following variables can be read in the Measuring Value Blocks:

- S contact status and terminal 15 status
- Reverse gear engaged Yes/No
- Control module supply voltage
- Camera supply voltage
- Rear hatch open/closed
- Present vehicle speed
- Calibration active/not active
- Status of most recent calibration
- Cause of failed calibration

The following properties are encoded in the module:

- Vehicle manufacturer VW/Audi
- Country version
- OPS (Optical Parking System) installation Yes/No
- Trailer hitch installation Yes/No
- Steering installed
- Camera height above ground (depends on chassis and tires)
- Vehicle model

The following variables can be configured in the adaptation channels:

- Start calibration
- Coordinate information for calibration of the camera
- Brightness, contrast and color settings of the video picture

Note
Please always consult the electronic repair information for diagnostic information on the system.

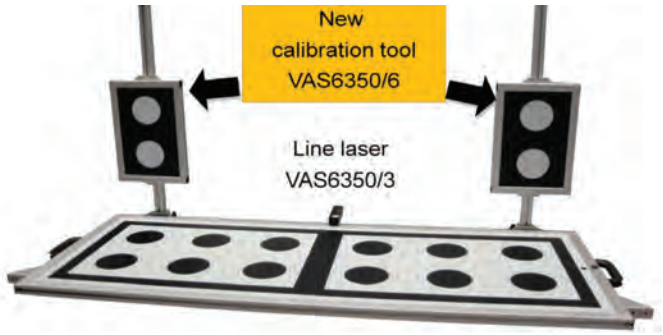
Calibration

The same calibration board is used to calibrate the Rear View Camera and the Lane Change Assistance System. However, the Doppler generator is not required.

An exact description of how the calibration board must be aligned to the vehicle is included in the pertinent Repair Manual, and is also briefly described in the Lane Change Assistance calibration section.

Additional care should also be taken to ensure that an exactly planar alignment is achieved using the three adjustable feet on the bottom of the calibration board. A bubble level is built into the calibration board and shows whether the board is in the required position.

The distance of the calibration board surface to the ground must be determined using a tape-measure and entered into the tester before the calibration process.



There is a hole next to the bubble level for measuring this distance. The calibration must be carried out in accordance with the instructions available in Guided Fault Finding.

If the calibration device is correctly aligned, the calibration program can be started in Guided Fault Finding.

The purpose of calibrating the Rear View Camera is to correct the compensation of the camera image. First, the two black bordered rectangles on the calibration board are located. Once they have been found, the six black circles inside them are located and their centers are identified. The actual positions of the circle centers is compared with the specified positions stored in the control module. From this information, the correction parameters are calculated and are used to continuously correct the camera image.

After which work is it necessary to carry out a calibration procedure?

- After replacing a camera
- After replacing the surround view control unit J928
- After repair work on components in which the cameras are installed
- After setting up the suspension
- After repairing the front or rear axle
- In the event of an offset in the overlapping area of two camera images

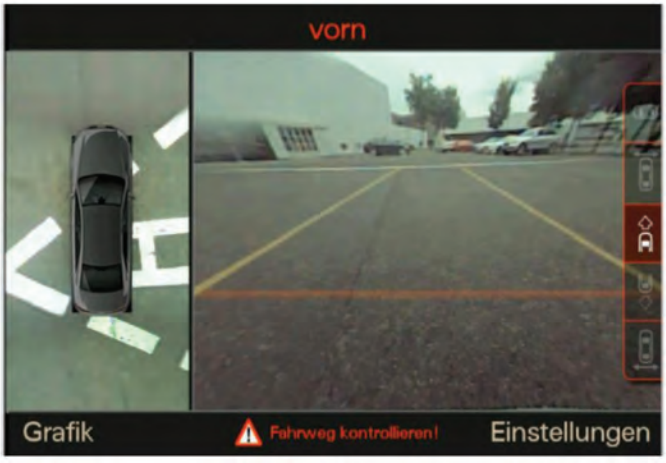
Appendix F

Display: Vehicle periphery ("TopView")

- View of the vehicle from above (bird's eye view)
- "Blind spots" such as lateral obstacles are identifiable
- Serves as a good orientation guide when maneuvering the vehicle into parking spaces

Display: View ahead of the vehicle ("FrontView")

- Allows the driver to make better use of maneuvering space
- Detection of obstacles ahead of the vehicle
- Left of screen : depending on selection, the system displays the vehicle periphery or the graphics of the Optical Parking System



Display: View behind the vehicle ("RearView")

- Allows the driver to make better use of the maneuvering space behind the vehicle
- Detection of obstacles behind the vehicle
- Additional option for displaying a support mode in the options menu at the top right

Knowledge Assessment

An On-Line Knowledge Assessment (exam) is Available for this Instructor-Led Course.

The Knowledge Assessment is required for Certification.

You can find this Knowledge Assessment at:
www.accessaudi.com

From the **accessaudi.com** Homepage:

- Click on the "ACADEMY" tab
- Click on the "Academy site" link
- Click on the Course Catalog Search and select "960322B - Driver Assistance"

Please submit any questions or inquiries via the Academy CRC Online Support Form which is located under the "Support" tab or the "Contact Us" tab of the Academy CRC.

Thank you for reading this Participant's Guide and taking the assessment.

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